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**Examining teachers' experiences in a professional learning community  
focused on integrating technology into literacy instruction**

by

**Jennifer M. Thoma**

A dissertation submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education

Program of Study Committee:  
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2016

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## **ABSTRACT**

Many factors, such as lack of time, access to technology resources, and professional development, have been indicated as barriers to technology integration in teaching. One possible way to support teachers as they integrate technology into their instruction is through professional learning communities . The purpose of this qualitative case study was to examine how teachers experienced a Professional Learning Community (PLC) focused on integrating technology into literacy instruction. In this study, the PLC framework was situated as the means for teacher learning and planning. As such, it provided opportunities for teachers to learn from one another as well as share their knowledge. Providing just-in-time professional development through explicitly mediated training sessions, tools were introduced to help guide the teachers' thinking and behavior as they worked to integrate technology into literacy instruction.

Three 5th-grade teachers from the same elementary school participated in this study. The research was focused on the processes and actions occurring within PLC meetings. Interviews were conducted to gather data, such as teachers' personal beliefs, that were unobtainable through PLC meetings. Also, memos of meetings and meeting transcriptions were taken to capture the essence of meetings. Different sources were used to triangulate the data to ensure reliability of the findings.

Results indicated a difference in how time was spent in a PLC between explicitly and implicitly mediated activity. The teachers experienced initial difficulty in using the technology integration planning cycle that was introduced to them due to a lack of ability to establish instructional goals. Several factors were found to impact teachers in the area of goal setting and how time was spent. Implications point to a need for guidance for teachers



in using the PLC process, time to engage in dialogue around goal setting, as well as time to learn about and problem solve using digital tools that may serve students during literacy instruction.

## **CHAPTER 1. INTRODUCTION**

### **Background**

With the extensive access to digital technology, vast amounts of information are at one's fingertips (Lankshear & Knobel, 2003). Thus, it is critical for students to learn how to make decisions about which technologies support their purpose. This decision-making is important because they will need to efficiently sort, organize, and make sense of the vast amount of information available to them. With the introduction of the Internet and other digital technologies, the world and how individuals approach information consumption and dissemination has dramatically changed (Coiro, Knobel, Lankshear, & Leu, 2008; Lankshear & Knobel, 2003). Information requires students to be both consumers and producers of digital information (Lankshear & Knobel, 2003). Technology should be taught specifically with literacy in mind because digital technologies are a primary way in which people communicate and share information (Leu, Kinzer, Coiro, & Cammack, 2004).

Despite the benefits of teaching students to use technology, technology integration is happening infrequently in schools or is happening in superficial ways (Ertmer, 2005; Hutchison & Reinking, 2011; Lawless & Pellegrino, 2007). Research has been conducted to determine why implementation is not occurring (e.g., Niederhauser & Perkmen, 2008; Zhao, Pugh, Sheldon, & Beyers, 2002). Barriers such as lack of time, access to technology resources, and professional development have all been cited as issues that prevent teachers from integrating technology into the classroom (Ertmer, 2005; Hutchison & Reinking, 2011). However, even when professional development is offered, there are few studies to guide the content and delivery of that professional development (Mouza, 2009). This lack of empirical

evidence may be due to the inconsistencies in defining effective professional development that focuses on technology integration (Lawless & Pellegrino, 2007).

One way of approaching technology integration professional development is through learning communities (Cifuentes, Maxwell, & Bulu, 2011; Curwood, 2011, 2014; Hughes, Kerr, & Ooms, 2005). Generally, it is agreed that professional learning communities (PLCs) exist to promote and sustain professionals in schools with the goal of enhancing student learning (Bolam et al., 2005). A PLC is generally thought of as a collaborative group that meets for a common purpose (DuFour & Eaker, 1998). Although the ultimate goal of a PLC is student achievement, much of the literature focuses on how well a PLC functions (Vescio, Ross, & Adams, 2008). Currently, only a small number of studies surrounding PLCs and student achievement exist, and each of these studies differs in the concepts and measurements used to define PLCs and measure student achievement (Lomos, Hoffman, & Bosker, 2011). A study conducted by Saunders, Goldenberg, and Gallimore (2009) showed significant growth in student achievement over the course of 3 years during which explicit protocols were used during grade level meetings and training for administrators was included.

Research centered on technology integration and professional development, which includes components of working collaboratively with colleagues, does exist (Kopcha, 2012; McDonald, 2008; Polly & Hannafin, 2010; Schrum & Levin, 2013). Yet, these studies do not focus specifically on PLCs as a process in which teachers may engage to both meet the needs of students academically and use technology as a means for achieving student goals. Thus, the purpose of this study was to examine how teachers experience a PLC using the

technology integration planning cycle (TIPC) model (Hutchison & Woodward, 2014) to integrate technology into literacy instruction.

### **Purpose of the Study**

Incorporating technology specifically within literacy instruction is important because digital technologies are a primary way in which people communicate and share information (Leu et al., 2004). Many barriers to technology integration, such as lack of time, access to technology resources, and professional development, have been found (Ertmer, 2005; Hutchison & Reinking, 2011). In the present study, the PLC framework was situated as the means for teacher learning and planning. As such, it provided opportunities for teachers to learn from one another as well as share their knowledge. Participation in PLCs creates social interactions that may provide a means for a more knowledgeable peer to guide others to a deeper understanding of technology, pedagogy, or content, consistent with Vygotsky's (1978) concept of the zone of proximal development. Vygotsky (1978) described the zone of proximal development as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving . . . in collaboration with more capable peers" (p. 86). Yet, little is known about such interactions, and collaborations may occur within PLCs and may depend on how teachers participate in PLCs. Thus, the purpose of this study was to understand how teachers experience a PLC focused on using the TIPC to integrate technology into literacy instruction. The definition of experience in this study is the processes which were occurring as the teachers worked together to integrate technology into literacy instruction (Charmaz, 2014).

### **Significance of the Problem**

Although the importance of technology integration has been touted by many professional communities (International Reading Association, 2009; International Society for Technology in Education, 2008; National Council of Teachers of English, 2013), technology integration is not as prominent in schools as may be expected based on the reported ubiquity of access to digital devices (Hutchison & Reinking, 2011; Karchmer, 2001; Wastiau et al., 2013; Wells & Lewis, 2006). Among the many perceived barriers to integration, two prominent barriers are lack of time to plan for technology integration and lack of professional development on how to integrate technology (Bauer & Kenton, 2005; Hutchison & Reinking, 2011; Zhao et al., 2002). One way to address these barriers simultaneously is through the PLC structure (DuFour, 2004; Van Lare & Brazer, 2013). Yet many factors exist in the broad community, the school community, and the social dynamics in which a PLC exists. Thus, the purpose of this case study was to gain understanding of how teachers experience a PLC in which the goal is to facilitate teachers' integration of digital technology into their literacy instruction by examining the complex processes that occur within a PLC.

### **Research Question**

This study examined how teachers experience a PLC using the TIPC to integrate technology into literacy instruction. The following research question was used to guide the study: How do teachers experience a professional learning community using the technology integration planning cycle to integrate technology into literacy instruction?

### **Definitions of Terms**

*Activity unit:* for this study, each separate PLC meeting. According to Vygotsky's (2012) theory, "units are products of analysis that correspond to specific aspects of the

phenomena under investigation” (p. 224). The unit of analysis in this study was each separate PLC meeting, each of which was analyzed for the processes occurring around the use of sign and tool in teacher dialogue.

*‘Appy Friday*: an e-mail containing lessons incorporating digital tools that were tied to the Common Core State Standards (CCSS) in the area of literacy sent weekly to those participating in the larger grant study.

*Artifact*: a commonly constructed sign made by teachers in the PLC group to record goal setting, pedagogy, and other work that had come about as a result of their dialogue and use of other signs.

*BAS Wheel of Reading Behaviors, A Network of Processing Systems for Reading*: a system of strategic actions for readers based on the work of Pinnell and Fountas (2009); a prompting guide based on the Benchmarking Assessment Kit by Fountas and Pinnell that features reading behaviors to notice, teach, and support in the area of thinking within the text, thinking about the text, and thinking beyond the text.

*Community*: the social context in which the activity system takes place.

*English Language Arts Common Core State Standards*: the set of literacy standards adopted by the state and school district in which this study took place.

*Mediating artifacts*: the tools or concepts (signs) used by the teachers within the activity system.

*Object*: goals or outcomes of the activity system, including goals of subjects and community.

*Professional Learning Community (PLC)*: in the district being studied, a group of teachers, usually, but not always, consisting of teachers teaching the same grade level or content area, who meet to answer the four questions: (a) What do we want students to

know and be able to do? (b) how will we know if they've learned it? (c) what will we do if they have learned it? and (d) what will we do if they have not learned it?

*Professional Learning Community (PLC) meeting:* A designated day of the week in which a PLC meets to answer the four guiding questions.

*PLC+ sessions:* a district-funded day or half-day of professional development during which teachers meet to learn more about their content area or answer the four guiding questions.

*Rules:* norms, behaviors, and guidelines regulating the activity system.

*Sign:* any common resource that teachers in the PLC group use to help them understand student literacy goals or pedagogy. "The sign . . . changes nothing in the object of a psychological operation. It is a means of internal activity aimed at mastering oneself the sign is *internally* oriented," (Vygotsky, 1978, p. 55).

*Subject:* actors engaged in the activity system (the teachers in the PLC).

*Tool:* in this study, referred to explicitly as the digital tool that teachers were proposing to use with students.

The tool's function is to serve as the conductor of human influence on the object of activity; it is *externally* oriented; it must lead to changes in objects. It is a means by which human external activity is aimed at mastering, and triumphing, over nature. (Vygotsky, 1978, p. 55)

The focus of this study was teachers' integration of technology into literacy instruction in order to help students reach their literacy goals.

## Overview of the Study

The present study used a case study designed to gain understanding of how three teachers experienced a PLC aimed at integrating technology into literacy instruction. Research suggests that, through dialogue, teachers are able to make sense of their school environment and educational reforms as well as reflect on their experiences (Curwood, 2014; Hughes et al., 2005). Therefore, providing professional development and a space for professional dialogue around practice through a PLC format may support teachers as they learn how to integrate technology into literacy instruction (Curwood, 2011, 2014).

Robert Stake (1995) stated that case studies can help in gaining understanding about how things function in the ordinary day-to-day environment. Researchers are interested in cases for both their uniqueness and their commonalities. The rich descriptions from a case can serve the *relativist* perspective, which acknowledges multiple realities of a situation (Yin, 2014). This means that no one absolute truth exists, as every experience is subjective, with multiple ways of interpreting the experience. Understanding these multiple realities can help researchers, administrators, and policymakers as they design and plan for implementation of new practices involving PLCs and technology integration within literacy instruction. For the purposes of this study, the researcher positioned herself within the relativist perspective in that the perceptions of the teachers as well as those of the researcher were considered as different truths, subjective to their own interpretations.

Multiple data sources were collected and analyzed to specifically account for processes that were occurring in the PLC. Specifically, the researcher met with a group of teachers over the course of 1 school year during their weekly scheduled PLC meetings. These meetings were audio recorded, and memos were created after each meeting to capture



the researcher's impressions as they related to the research question. Additionally, two professional development sessions, called PLC+ sessions, were provided for half-day training specifically centered on setting student learning goals with the English Language Arts Common Core State Standards (CCSS) and integrating technology into literacy instruction. These sessions were also audio recorded and transcribed. Finally, the teachers participated in two face-to-face, open-ended interviews as well as an open-ended survey that was administered via e-mail. Data were analyzed using grounded theory techniques (Charmaz, 2014; Stake, 2014; Strauss & Corbin, 1998). Grounded theory techniques were used as a means to avoid preconceptions of themes that may have emerged during data analysis (Charmaz, 2014; Yin, 2014).

## **CHAPTER 2. REVIEW OF THE LITERATURE**

### **Introduction**

The purpose of the present study was to examine how teachers experience a PLC using the TIPC to integrate technology into literacy instruction. Accordingly, this chapter includes a review of the literature on technology integration in literacy instruction, professional development on technology integration, and PLCs as a form of professional development. Further, this chapter presents the conceptual framework that guided the present study and describes the TIPC (Hutchison & Woodward, 2014) that was used by the teachers participating in the PLC that was the focus of this study.

### **Role of Technology Integration in Literacy Instruction**

With the introduction of the Internet and other digital technologies, the world, and how many approach information consumption and dissemination, has dramatically changed (Coiro et al., 2008; Lankshear & Knobel, 2003). Instead of information being limited to a finite number of consumers, a vast majority of the global population now has access to an infinite amount of information (Lankshear & Knobel, 2003). Instead of there being just an elite club of producers of information, now anyone can share knowledge and opinions and publish them digitally (Martin et al., 2010). The forms and functions of traditional literacies, such as reading and writing, are being redefined as they carry new potential with the use of new technologies. Students will need to learn how to make decisions about which technologies to use as well as which forms of technology support their purposes for literacy. These will be important skills as the nature of technologies of literacy change so rapidly (Leu et al., 2004).

Furthermore, ever-increasing digital technologies and the related digital literacy skills necessary for reading and writing with them create a need for a change in the content and delivery of literacy instruction. Integrating technology instruction into literacy instruction is necessary because of the very nature of literacy instruction. Due to the introduction of digital technology into everyday life, the term literacy has been redefined. Literacy can mean anything that is in alphabetic writing, vocabulary, and recall, or it can mean conceiving and communicating in multiple media and modality forms (Coiro et al., 2008). Literacy teachers are responsible for teaching communication skills in reading and writing to build foundational literacy skills that students will need in many genres of communication in both academic and daily life (Hutchison & Reinking, 2011). Thus, classroom instruction should involve a significant shift in the types of reading, writing, and communicating that students learn to do.

Further, the CCSSs for reading, writing, speaking, and listening (National Governors Association Center for Best Practices & Council of Chief State School Officers [NGA Center & CCSSO], 2010) include standards at all grade levels regarding the digital skills that students should have to be considered fully literate. Other professional associations have also outlined the technology skills that are necessary for students and teachers to be literate in the 21<sup>st</sup> century (International Reading Association, 2009; International Society for Technology in Education, 2008).

Despite the recognized need to integrate digital technology into literacy instruction, research has shown that the integration of technology into the literacy classroom has been minimal and superficial (Hutchison & Reinking, 2011). Hutchison and Reinking (2011) argued that integrating digital technology into literacy instruction will require unique skills,

strategies, and dispositions by both students and teachers. If these skills, strategies, and dispositions are left out of instruction, students will be unprepared for mainstream reading and writing. Yet, there are many barriers that teachers face when considering how to integrate technology into the classroom. These barriers are discussed next.

### **Barriers to Integrating Digital Technology into Instruction**

Researchers have been studying barriers to technology integration for over a decade, using a variety of approaches. One of the earliest landmark studies on barriers to technology integration was conducted by Zhao et al. (2002) in their case study of the complex process of technology integration in the K–12 classroom. For one year, the researchers studied K–12 teachers who carried out technology-rich projects in their classrooms. Initially, 118 teachers were selected to participate in the research. A survey was conducted to find a smaller subset of teachers to further inform the study. Finally, 10 cases were selected to inform the case study. The researchers used a scale to measure six constructs that had been identified in the literature as being relevant to technology integration: technology proficiency, computer anxiety, attitudes and beliefs toward technology in education, pedagogical styles, and experiences preparing for the grant proposal. Eleven factors emerged that significantly impacted the degrees of success of technology innovation in the classroom. Each factor fell within the domain of innovator (teacher), innovation, and context. The authors found that technology projects were less successful when they did not align with school culture. In other words, the further a technology project deviated from the school's set of values, pedagogical beliefs, and practices, the less successful the projects were. Another finding from the study was that the context of human infrastructure, technology infrastructure, and social support had an effect on the success of the technology projects.

Subsequent to Zhao et al.'s 2002 study, Bauer and Kenton (2005) examined K–12 teachers in two elementary schools, one middle school, and one high school. A mixed methods approach was used, comprising a Likert-type scale survey and qualitative data from classroom observations, and interviews. In studying 30 technology-savvy teachers, Bauer and Kenton found that the major obstacles to integration included hardware such as not enough computers, old and slow computers, and inconsistent formats. Another obstacle found in the study was time, both time to prepare and deliver lessons and time to engage students from start to finish during class time. Student computer skill level, which included keyboarding and the digital divide of some students having access at home and others no access, was another obstacle found. Finally, the Internet, specifically school systems blocking or censoring searches, was seen as a barrier.

In a 2007 study, Hew and Brush identified general barriers typically faced by K–12 educators when integrating technology into instruction. These barriers are faced by educators not only in the United States but in other countries as well. The authors analyzed results from 1995 to 2006 using existing studies that reported empirical findings. Only studies including K–12 educators and empirical data were used. Six main categories were developed from over 123 identified barriers in the research, namely: (a) resources, (b) knowledge and skills, (c) institution, (d) attitudes and beliefs, (e) assessment, and (f) subject culture. Resources included technology, access to technology, time, and technical support. Knowledge and skills included not only technological skills to operate technology but also the pedagogical knowledge to integrate technology effectively into instruction. Institution barriers were leadership, school time structures, and school planning. Attitudes and beliefs were feelings that indicated whether a person liked or disliked something (i.e., the use of

technology). Assessment barriers were defined as high-stakes testing that put pressures on schools in terms of how they allocate time spent on new instructional skills including technology integration. Subject culture was the long-standing institutionalized practices within schools. The authors gave an example of an art teacher who stated that painting is better understood if done physically with one's own hand, not by using a computer mouse.

In comparison, Hutchison and Reinking (2011) conducted a large-scale survey of 1,441 teachers (predominantly literacy teachers) to determine what barriers existed in integrating technology instruction into literacy and language arts instruction. This study was the only study found that focused specifically on literacy instruction rather than general technology integration. Similar to Bauer and Kenton (2005), Hutchison and Reinking found the following barriers: lack of time, lack of technology and access to equipment, necessity of teaching basic computer skills before moving on to more complex tasks, and difficulty controlling information students were able to access online. Other barriers found in that study that had not been found in previous research included lack of professional development, lack of time to integrate due to high-stakes testing, ability to evaluate student work, difficulty of level of internet text, and ability to integrate technology specific to literacy instruction

In a similar vein, Hechter and Vermette (2013) surveyed 433 science teachers from grades K–12 to gain a better understanding of the challenges and barriers teachers experience when integrating technology into the classroom. This study, completed in Canada, used an open-ended survey to gather data via an online format. Access to technology was the leading barrier to technology integration for science teachers in this study. Time was also cited by 55% of the participants as a critical factor preventing technology use, including time for

teachers to learn the technology, time to plan for integration, time needed to teach demanding curriculum, and time for students to learn the technologies. Other barriers cited by over 50% of participants were training and lack of resources.

Ertmer and Ottenbreit-Leftwich (2013) classified barriers to technology integration into internal and external barriers. They described external barriers, or first-order barriers, as barriers that are external to the teacher; these external barriers include elements such as time, access to technology resources (both hardware and software) and experts, and professional development. Ertmer and Ottenbreit-Leftwich classified internal barriers, or second-order barriers, as barriers that are internal to teachers and include teachers' values, beliefs, and dispositions that support technology integration into instruction. Although a district or building may have all of the external supports in place, low levels of integration may still occur due to the influence of internal barriers, such as the lack of belief in the value of technology integration (Ertmer, 2005). Relatedly, in a path analysis from survey responses of over 1,400 teachers in the United States, Hutchison and Reinking (2011) found a direct relationship between teachers' beliefs about technology integration and the extent to which teachers integrate technology into their literacy instruction. They also found that there were several mediating variables that may impede technology integration even when teachers have positive beliefs about the importance of technology integration. This finding indicates the importance of both teachers' beliefs (which may serve as an internal barrier) and of the external barriers that teachers face. Both types of barriers must be considered when trying to increase technology integration.

### **Professional Development on Technology Integration**

Teachers must be ready to equip students with the skills they will need for the 21st century (Swan Dagen & Bean, 2014). Although teacher preparation programs have a part in this, all teachers will need ongoing learning, also known as professional development, to remain current in teaching practice that is research based. Professional development may be particularly important as it relates to technology integration given that technology changes rapidly and its use in classrooms continues to grow and change. Therefore, this section explores current research on professional development and technology integration.

#### **Professional Development and Technology Integration**

Numerous studies have been conducted to understand the effectiveness of professional development aimed at improving technology integration. One such study, known as eMINTS (enhancing Missouri's Instructional Networked Teaching Strategies), was conducted by Martin et al. (2010). Their study examined the relationships between professional development quality and classroom instruction in grades 3–5 over 2 years. The eMINTS program is closely aligned with the International Society for Technology in Education's National Educational Technology Standards for Students. The professional development used for this study included several components. First, an instructional specialist modeled instructional techniques that were presented in the professional development sessions. Second, the instructional specialist included collaborative learning and community building within the sessions. Third, the instructional specialists used technology to support their instruction and helped participants to use technology to work on their projects during professional development sessions. The instructional specialists worked to help participants make connections between the professional development sessions and



their classroom practice. Finally, the instructional specialists discussed how to integrate inquiry-based learning into instruction. The researchers examined the program's core components and the fidelity with which the program was implemented across sites. In addition to this, the researchers examined teacher knowledge of the concepts within the program and how these varied in relation to the professional development fidelity across sites. Finally, the researchers examined the variations of professional development fidelity across student outcomes over 2 years.

Martin et al.'s (2010) study included observations of 31 instructional specialists and 269 teachers from 71 different schools. The findings indicated a strong correlation between professional development fidelity and the quality of teachers' lesson plans,  $r(151) = .302, p < .001$ . In addition, a positive correlation was found between the amount of time instructional specialists spent in planning lessons with teachers and the quality of lesson plans,  $r(154) = .186, p < .05$ . Incidentally, the amount of time instructional specialists spent solving implementation problems was negatively correlated to the quality of lesson plans,  $r(154) = -.181, p < .05$ . In relation to student achievement, lesson plan quality scores and student achievement scores for third graders were positively correlated for two separate assessments, communication arts assessment,  $r(606) = .11, p < .01$ , and mathematics assessment,  $r(606) = .086, p < .05$ . The results from this study indicated that teachers who experienced higher professional development fidelity had a greater understanding of program concepts with better lesson plans and some indication of higher student achievement.

Mouza (2009) conducted a longitudinal multiple case study with seven participants. All participants took part in in two Eiffel professional development models during 1 academic year. The Eiffel Project was a multi-million-dollar project funded by the U.S.

Department of Education with a goal of demonstrating that new digital technologies could help educators improve pedagogical approaches. Activities within the Eiffel Project included hands-on activities with computers for participants, collaborative workshops aligned to classroom practice, assessment and response to teachers' needs, modeling activities that teachers would use with students, feedback on lesson design, and work with teachers from the same school. Participants had no previous experience with technology integration. Data were collected through interviews, observations, surveys, and artifacts. The data were analyzed for long-term learning in the area of sustainability and growth. Results indicated that, by participating in professional development based on research, teachers' technology knowledge, ability to plan for and integrate technology into students' experiences, and beliefs about technology integration changed. The author suggested that grounding professional development in best practices can positively impact teacher learning and practice. These findings would support the conclusions drawn by Martin et al. (2010), suggesting that professional development based on research leads to positive impact on classroom practices with technology integration.

O'Hara, Pritchard, Huang, and Pella (2013) reported how teachers examined a professional development model that focused on teachers' knowledge and behaviors regarding integrating technology into teaching and learning. A pre/post measure of the Knowledge/Use Scale was used along with teacher reflections, classroom observations, and student technology-proficiency data. For this model of professional development, the researchers worked with the district to align to the district's strategic goals. Teachers worked with instructional leaders as they learned to use technology, and they were provided time to develop technology-enhanced curriculum. Teachers' self-reported knowledge of both

integrating technology and content increased from the beginning of the study to the end of the study on the Teacher Knowledge/Use of Instructional Components: pretest mean = 2.8 ( $p < .001$ ), posttest mean = 4.06 ( $p < .001$ ). The findings from this study suggest that professional development models that are designed specifically around technology integration within teaching and learning that focuses on participants' needs and interest can improve teacher knowledge.

In order to address ways to overcome barriers to technology integration, Kopcha (2012) studied 18 elementary school teachers over a 2-year period. Using a case study design, Kopcha provided sustained and situated professional development over this 2-year period. Teacher-led communities of practice were established through mentoring over the 2 years of the study. During this time, teachers' perceptions of barriers were examined over time through interviews, surveys, and observations. From the beginning of the study to the end of the study, it was found that time continued to be the biggest perceived barrier for teachers. The time barrier included finding time to plan for activities, spending instructional time on technology issues, and finding time to learn new technology skills to teach with technology. In regard to beliefs, over half of the participants felt their beliefs about technology integration grew stronger as a result of the professional development. Five teachers felt that the experience helped them gain confidence with technology.

Collectively, these studies call for research that examines teacher changes over time. The use of structured professional development has been shown to influence changes in teachers' instructional practices in the area of technology integration. Thus, these studies were used to inform the nature of the present study.

## **The Role of Professional Learning Communities and Technology Integration**

Another approach to professional development that has been studied in recent years is the use of PLCs to support teachers with integrating new practices. The following section explains what PLCs are and describes research on PLCs and technology integration.

### **Emergence of Professional Learning Communities**

International studies have demonstrated that educational reform efforts depend on teachers' individual and collective capacity or ability to create change within schools that demonstrates impact on student achievement (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). Building capacity is a complex process that involves culture, structures of support, and strong leadership. One movement that has shown promise for supporting educational reform is that of PLCs. The concept of collaborative teams of teachers is not new (Bullough, 2007). In 2002, Kridel and Bullough re-examined one of the most comprehensive studies in American education, often referred to as the Eight-Year Study. They described parallels from this legendary project of the 1930s and characteristics of effective PLCs that draw from current research. They pointed out several characteristics and practices that foster the growth of teachers including valuing inquiry; human capacity to solve problems; and a common, shared vision among staff. Stoll et al. (2006) explained that the PLC concept has emerged from several sources, beginning with Dewey's ideas of educational practices that provide data, subject matter, and inquiry.

The concept of a PLC has more than one interpretation in the literature, which has made operationalization of the term difficult (Lomos et al., 2011). This has also made implementation of the fundamental concepts behind the initiative prone to failure (DuFour, 2004). Without adhering to the big ideas or core principals of PLCs, schools struggle to

implement these learning communities. This leaves them searching for the next “silver bullet” for school improvement.

Generally, it is agreed that the purpose of a PLC is “to promote and sustain the learning of all professionals in the school community with the collective purpose of enhancing pupil learning” (Bolam et al., 2005, p. 7). Much of the literature on PLCs has recognized five common characteristics of an effective PLC (Bolam et al., 2011; Lomos et al., 2011; Saunders et al., 2009; Swan Dagen & Bean, 2014; Vescio et al., 2008). Although these five characteristics may be stated in different ways, the common components are that communities: (a) share a common view of mission, (b) reflect on instructional practices, (c) cooperate and engage in reflective dialogue, (d) provide one another with feedback on teaching activities, and (e) focus on student learning. Additional characteristics of effective PLCs that have been identified through research, though not as common, are the following: mutual trust; inclusive membership beyond teaching staff; and openness, networks, and partnerships (Bolam et al., 2005; Stoll et al., 2006).

Although an entire school should function as a PLC, the basic structure of a PLC is a collaborative group that meets for a common purpose (DuFour & Eaker, 1998). A PLC may consist of grade-level or content-area teachers, administrators, and support staff. But DuFour and Eaker (1998) suggested also involving parents, community members, area businesses, and students. This helps schools to gain feedback from others and involves all stakeholders when implementing change in schools.

### **Research on Professional Learning Communities**

It is important to keep in mind the end goal of functioning as a PLC. The goal is not to be a PLC but to improve student achievement (Stoll et al., 2006). Although some of the

literature has focused on PLCs and student achievement (Lomos et al., 2011; Saunders et al., 2009; Strahan, 2003; Vescio et al., 2008), much of what has been written has focused on the extent to how well a PLC functions (Vescio et al., 2008). Understanding how PLCs function is important given that student achievement may not be affected by teacher participation in a PLC if the PLC is not functioning well.

In a recent review of literature, Vescio et al. (2008) reviewed 11 studies to examine how teaching practices change as a result of participation in a PLC and what aspects of PLCs support those changes. All 11 studies reported positive results through teacher participation in PLCs. Vescio et al. concluded that PLCs honor the knowledge and experience of classroom teachers and that PLCs can support teachers in making decisions based on their contexts, goals, and current and new professional knowledge as well as the needs of their students

The studies examined by Vescio et al. (2008) were mostly qualitative. Only two provided robust quantitative analysis of survey and achievement data. In an effort to provide clearer data on PLCs and their impact on student achievement, Lomos et al. (2011) performed a meta-analysis to provide quantifiable data on PLCs and student achievement data. The authors synthesized five studies that linked PLCs to student achievement outcomes in secondary schools. Some of the limitations the authors pointed out were the small number of studies included, the small number of countries represented (United States, England, and the Netherlands), and the differing concepts and measurements employed in each of the five studies. The authors studied several variables that are integrated into the concept of professional communities. The effect sizes obtained, ranging from .22 to .56, were different for each study. The overall effect size for the meta-analysis was .25 at the 95% confidence

interval for the correlation coefficient. These studies indicate that professional communities may have a small positive effect on student achievement.

Another study that examined PLCs and student achievement data was conducted by Saunders et al. (2009). The researchers explored the effectiveness of PLCs in Title I schools, focusing on examining student data and implementing effective practices in literacy instruction. In this study, the authors conducted a quasiexperimental investigation of the effects of the use of explicit protocols during grade-level team meetings on student achievement. During Phase 1, which lasted for 2 years, only principals were provided training. During Phase 2, which lasted for 3 years, school-based training was provided for principals and teacher leaders. Phase 1 produced no effects. Phase 2 produced effects in which students in the experimental groups improved at a faster rate than did those in comparison groups and exhibited greater growth over 3 years on state-mandated and achievement tests. Results showed that an impact did appear in years 3, 4, and 5 after Phase 2 had been initiated. Effect sizes for Phase 2 intervention were moderate to large (0.63, 0.64, and 0.88, respectively) for each year. This shows that, following support from the researchers, significant growth was made in student achievement. The effect size nearly quadrupled during the last year of the experiment.

Much of the literature on PLCs focuses on either what a PLC is (Stoll et al., 2006; Van Lare & Brazier, 2013), what happens in a PLC (Dooner, Mandzuk, & Clifton, 2008; Englert & Tarrant, 1995), or descriptions of PLCs as professional development (Cifuentes et al., 2011; Hollins, McIntyre, DeBose, Hollins, & Towner, 2004; Jones & Dexter, 2014; Kidd, 2013). Research focused on technology integration and professional development has included components of working collaboratively and problem solving with colleagues

(Kopcha, 2012; McDonald, 2008; Polly & Hannafin, 2010; Schrum & Levin, 2013) but have not focused specifically on PLCs as a process in which teachers may engage to both meet the needs of students academically as well as to include new ways of using technology in instruction. One of the five characteristics of an effective PLC is focus on student learning. Few studies exist that have focused on what this process looks like when technology integration is included in this complex process.

The PLC process is one way by which teachers may successfully explore ways in which to integrate technology. Little research has been conducted to examine what actually happens during a PLC focused on technology integration (Van Lare & Brazer, 2013). A few studies have examined groups of teachers in which technology integration was included within a collaborative community (Cifuentes et al., 2011; Curwood, 2011, 2014; Hughes et al., 2005). Those studies are examined next.

### **Research on Professional Learning Communities and Technology Integration**

In 2011, Curwood examined secondary high school English language learning communities. The researcher facilitated two technology-focused learning communities in high schools in the United States. Each community met for one school year, engaging in hands-on learning with digital tools, creating technology-infused lessons, sharing students' work, and reflecting on practice. The two goals of the learning communities were: (a) to increase knowledge of technology and its integration into secondary English curriculum, and (b) use technology to support student achievement and engagement. The data collected included video recordings, field notes relating observations, audio recordings of semistructured interviews, and teacher reflections.



Curwood (2011) found that technology integration can be supported by professional development that features “sustained dialogue around teachers’ curricular goals and students’ learning outcomes; hands-on learning with digital tools; the ongoing analysis of student work; and a view of knowledge as a social construction” (p. 68). This type of professional development provided teachers with the time and space to engage in dialogue, collaboration, and curricular innovation. Curwood (2011) warned that it is not enough to just create space for dialogue in order to facilitate technology integration in schools. She argued that effective technology-focused professional development must include sustained dialogue around teachers’ curricular goals and students’ learning outcomes, hands-on learning with digital tools, ongoing analysis of student work, and an understanding of knowledge as social construction.

Using data from the same study, Curwood (2014) used a discourse analysis to evaluate how teachers’ language use and cues within a learning community reflected their cultural models (or everyday beliefs) about technology. The purpose of this study was to examine how discourse analysis may reveal teachers’ cultural models within a PLC, what their cultural models are, and how these cultural models shape their technology integration into English curriculum. Using a 4-minute event, the researcher examined the data for social interactions (what was the speaker doing) and cultural models (how cultural models were represented). Curwood’s (2014) results show that teachers’ beliefs and practices about technology are influenced by participation in a learning community.

In a study focused on content-focused inquiry groups, Hughes et al. (2005) examined what teachers learned about technology and integrating technology for student learning while participating in an inquiry group. The researchers also studied the physical and social

contexts of the inquiry group and how these influenced teachers' learning and technology integration. Five teachers from the same middle school volunteered to participate in the inquiry group offered by the researchers. A longitudinal multiple-case research design was used with each case as the unit of analysis. The data revealed that teachers tapped into the shared expertise of others to develop ideas and negotiate meaning. The researchers noted that, in having outside experts (the researchers) lead the teachers, teachers may not build their own technological capacity as listed in the National Educational Technology Standards for Teachers if they rely on outside experts too heavily. Although the researchers found that there is a desire and need for collaborative technology learning within a community of learners, using PLCs in this capacity may be limited if the public's and educators' views of the role of the teacher do not shift.

In a study by Cifuentes et al. (2011), the researchers examined the effectiveness of the STAR learning community in three school districts. The STAR learning community was a learning community developed by the researchers to support technology integration in classroom instruction and consisted of three school districts and a university. The university supported these schools with technology integration in classroom instruction. This study used mixed methods over a 2-year period to determine the increase of technology adoption and to describe the impacts on the PLC. Data were collected through classroom observations, interviews, project evaluations, and surveys. Significant differences were observed from the Stages of Adoption surveys from the beginning of the project ( $M = 3.44$ ,  $SD = 1.09$ ,  $p < .001$ ) to the end of the project ( $M = 4.78$ ,  $SD = .95$ ,  $p < .001$ ). Pre and post observations on students' active engagement during class also changed significantly. Initial observations revealed that students were disengaged an average of 25% of the time. By the

beginning of the second year, 16% of students were rated as disengaged. Trends from the data revealed that, as a shift to more technology integration was occurred, students' cognitive engagement increased and instruction shifted from teacher centered to student centered. Teachers reported valuing the experiences of the learning community but felt it would be costly to maintain in terms of both money and hours out of the classroom.

Studies by Curwood (2011, 2014) and Hughes et al. (2005) provide qualitative data about professional development that incorporated a PLC type of framework. This PLC framework provided teachers a space in which to engage in dialogue around content, technology, and student learning outcomes. Curwood (2014) provided an in-depth discourse analysis of the processes occurring within this structured dialogue. Finally, Cifuentes et al. (2011) used mixed methods to demonstrate trends of student engagement, student-centered instruction, and increase in technology integration into instruction. In each of these studies, teachers voluntarily participated in the inquiry group or PLC. Yet, teachers are often grouped together by grade level or content area and told they must function as a PLC. Although this makes sense intuitively, teachers are not always aware of the actions they must undertake to function as a highly effective group. Thus, the present study examined a group of teachers in the same grade level who were expected to function as a PLC.

### **Conceptual Framework**

This study was based on the idea that technology integration into literacy instruction is important for students (International Reading Association, 2009; International Society for Technology in Education, 2008). Professional development through the use of a PLC structure is one way to support teachers with the complex nature of incorporating technology into literacy instruction (Cifuentes et al., 2011; Curwood, 2011, 2014; Hughes et al., 2005).

Participants in this case study took part in a PLC aimed at integrating technology into literacy instruction. Vygotsky's (1978) social development theory provides the conceptual framework that was used to design and analyze the present study.

### **Social Development Theory**

Vygotsky's (1978) theory on social interaction as a means for cognitive development supports the use of the PLC process as a framework for professional development. Other researchers have called these social knowledge-building groups PLCs or have used other names such as inquiry groups (Cifuentes et al., 2011; Curwood, 2011; Hughes et al., 2005). These types of groups provide spaces for teachers to build common knowledge and learn from each other, which aligns with Vygotsky's (1978) social development theory. Second, Vygotsky's (1978) theories on tool and sign describe the nature of how teachers apply the TIPC (Hutchison & Woodward, 2014), which was introduced in the study, and the English Language Arts CCSSs (NGA Center & CCSSO, 2010), first through explicitly mediated activity and then through implicitly mediated activity. Mediated activity is the use of tools, signs, or language to alter activity. When a tool or sign is intentionally introduced to a group by a third party, this is called explicit mediation. Implicit mediation typically involves signs in the form of language that has evolved within the original group. Vygotsky's (1978) ideas on internalization of higher psychological functions serve as a means of generating concrete action from thought. The PLC framework is the social structure that was used in this study to explore social interactions of teachers as they work to incorporate technology into literacy instruction.

In order to use Vygotsky's (1978) theory as a framework, the basic tenants of his theory must be explained. First, it must be understood that, fundamentally, this theory

examines the development of thought processes in children. Although this theory may be applied to adult thinking and learning, this was not the true intent of Vygotsky's work (Daniels, Cole, & Wertsch, 2011). For this study, Vygotsky's (1978) theory was applied to adult thinking and learning with the understanding that this was not the original purpose of his work. In this study, explicit mediation occurred around the mediating artifacts (tools and signs) of the English Language Arts CCSSs and the TIPC. The researcher provided explicit mediation using these tools to provide teachers with experiences by which they were able to build common understanding together of both the English Language Arts CCSSs and the TIPC. Although Vygotsky's (1978) work focused only on children, other researchers have used his model to provide explicit mediation for adults as well (Daniels et al., 2007; Postholm, 2015).

Vygotsky (1978) believed that psychological inquiry should never be a goal in and of itself. Culture and consciousness should be the actual subject of inquiry, whereas psychology should be a conceptual tool or a means of investigation. Inquiry must take into account the evidence and clues such as philosophical arguments and anthropological data. During a time when psychology was heavily influenced by behaviorism, Vygotsky (2012) sought to change the way in which mental functions were examined. Mental functions consist of lower mental functions, such as perception, memory, and will, and higher mental functions (Vygotsky, 2012). Higher mental functions, Vygotsky (2012) explained, were cultural functions that appear as a transformation of the lower functions. They are organized according to specific human social goals and means of conduct. Higher mental functions lie outside of the individual in psychological tools and interpersonal relations (Vygotsky, 2012).

Vygotsky (2012) believed that two major misunderstandings were holding back developmental psychology at the time:

1. A way of explaining higher forms of behavior and mental life by means of principles established for elementary (lower) functions
2. Transferring the explanatory principle found in the investigation of higher forms of behavior to study the lower ones.

Essentially, Vygotsky (2012) understood that by trying to explain higher forms of mental function by using methods for explaining lower mental functions, many of the complexities of higher mental functions, such as culture and social factors, were left out of the explanation. The basic problem of methods used to explain higher and lower mental functions was that consciousness was used to explain consciousness and behavior was used to explain behavior. However, “human mental functions must be viewed as products of mediated activity. The role of mediator is played by psychological tools and means of interpersonal communication” (Vygotsky, 2012, p. xxxix). Psychological tools include gestures, sign systems, mnemonic techniques, and decision-making systems. In the present study, the PLC framework was situated as the means for teacher learning and planning. As such, it provided opportunities for teachers to learn from one another as well as to share their knowledge.

Vygotsky’s (1978) concept of the zone of proximal development refers to the distance between the actual developmental level in children, as determined by independent problem solving, and the level of potential development when problem solving along with an adult. With respect to Vygotsky’s (1978) zone of proximal development, these social interactions provide a means for a more knowledgeable person to guide others to a deeper understanding

of technology, pedagogy, or content. “[The zone of proximal development] is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving . . . in collaboration with more capable peers” (Vygotsky, 1978, p. 86).

**Tools and signs in the social development theory.** The use of tools, Vygotsky (1978) explained, demonstrates that there is no single organically predetermined “internal system of activity that exists for each psychological function” (p. 55). The use of a tool fundamentally changes all psychological operations and broadens the range of activities in which psychological functions may operate. In this way, the term *higher* psychological function is referred to as the use of both sign and tool. Thought processes become more complex and diverse.

In his book *Thought and Language*, Vygotsky (2012) explored the relationship between words and consciousness. He explained that speech originates through social interactions. Only through development does speech become internalized verbal thought (Vygotsky, 2012). It is through the use of speech that people are able to extend action both forward and backward.

Future activity that can be included in an ongoing activity is represented by signs. As in the case of memory and attention, the inclusion of signs in temporal perception does not lead to a simple lengthening of the operation in time; rather it creates conditions for the development of a single system that includes effective elements of the past, present, and future. This emerging psychological system in the child now encompasses two new functions: *intentions and symbolic representation of purposeful actions*. (Vygotsky, 1978, p. 36)

Here, Vygotsky explained how speech can be used to see action as something that has happened, is happening now, and will happen. Therefore, children are able to formulate problems through the use of speech.

Vygotsky (1978) explained the difference between signs and tools as two divergent means of mediated activity:

A most essential difference between sign and tool, and the basis for the real divergence of the two lines, is the different ways that they orient human behavior.

The tool's function is to serve as the conductor of human influence on the object of activity; it is *externally* oriented; it must lead to changes in objects. It is a means by which human external activity is aimed at mastering, and triumphing, over nature.

The sign, on the other hand, changes nothing in the object of a psychological operation. It is a means of internal activity aimed at mastering oneself; the sign is *internally* oriented. These activities are so different from each other that the nature of the means they use cannot be the same in both cases. (p. 55)

Mediating artifacts are psychological tools that are used in higher mental functioning. Higher mental functioning occurs when complex ideas can be conveyed through signs and symbols, often altering behavior or thought patterns. Borrowing from behaviorism, when organisms are confronted with a stimulus, they respond ( $S \rightarrow R$ ). Vygotsky's "sign system" illustrates a complex representation of a mediated act in which the sign possesses an informational value. This value is interpreted by the organism, eliciting a response based on the information from the sign. The stimulus–response is replaced by a mediated act:

Psychological tools are initially directed toward a partner (Vygotsky, 1978). They then become a means of controlling one's own mental process. At some point, the signs



become internal and mental functions are mediated from within. Using an external stimulus such as an artifact is no longer necessary.

When tools, signs, and language are used by a third party to alter the activity of individuals, this is known as mediated activity. Mediated activity can be either explicit or implicit (Daniels et al., 2007). When teachers experience explicitly mediated activity, the use of signs and tools are brought in by an outside party. “Explicit mediation involves the intentional introduction of signs into an ongoing flow of activity. The signs tend to be designed and introduced by an external agent, such as a tutor, who can help reorganize an activity in some way” (Daniels et al., 2007, p. 185). In the present study, explicit mediation occurred when teachers participated in initial training around the TIPC model as well as when they participated in the PLC+ training sessions. Implicit mediation, on the other hand, typically involves signs in the form of language that has evolved in the service of communication.

It is important to note that Vygotsky (1978) did not draw a neat line to distinguish the use of a sign as explicit or implicit. In fact, “signs first emerge in social and individual action without their users’ full understanding of their meaning or functional role” (Daniels et al., 2007, p. 186). When those using a sign gain deeper insights to its meaning, they internalize the meaning and change behavior. Therefore, what was once explicit mediation becomes implicitly mediated by the individuals who have learned the complex meaning of the sign, which results in changed behavior.

### **The Technology Integration Planning Cycle for Literacy and Language Arts**

The TIPC for Literacy and Language Arts (Hutchison & Woodward, 2014) is an approach for planning instruction into which digital technology is integrated. It was created

to guide the complex nature of drawing on teachers' technological pedagogical and content knowledge (TPACK; Mishra & Koehler, 2006) that is needed to plan meaningful instruction that includes technology. The TIPC was used by teachers in the present study.

The planning cycle assists teachers with meaningful technology integration, starting with the instructional goal. This cycle includes seven critical elements. Hutchison and Woodward (2014) stated that these seven elements influence teachers' instructional planning and determine the success or failure of implementing digital technology into classroom instruction. The seven elements are: (a) identification of an instructional goal, (b) determination of instructional approaches, (c) determination of the digital tools that best suit the instructional approaches, (d) decision if the digital tools contribute to instruction, (e) examination of potential constraints of the digital tools—plan for potential problems, (f) delivering of instruction, and (g) reflection on the entire process. Each step is reflected in Figure 1, all contained within the sphere of reflection. The cycle includes five steps with two exit points. Each step is encompassed within the sphere of reflection.

In the cycle, there are two exit points suggested to teachers to use when they decide not to use digital technology (Hutchison & Woodward, 2014). The first exit point is during the third phase of the planning cycle, at which point teachers determine the digital tools that best suit the instructional approaches. If teachers decide the best way to get students to the learning target is with paper and pencil, then the use of digital tools should be abandoned. The second exit point is during the fifth phase of the cycle, at which point teachers examine potential constraints of the digital tools. If the constraints of using the tool will take away from the instructional goal, then teachers should not use the digital tool.

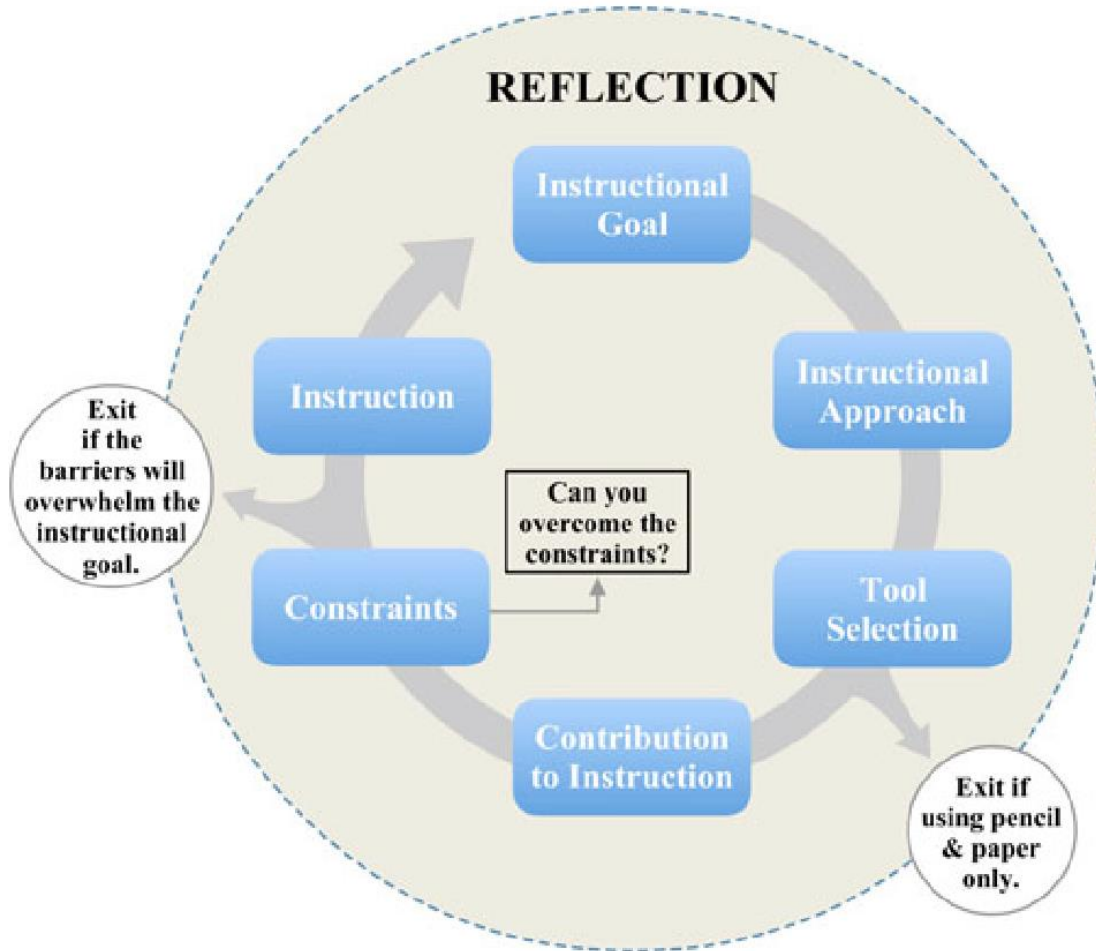


Figure 1. The technology integration planning cycle (Hutchison & Woodward, 2014, p. 459).

An example of how teachers may use the TIPC is as follows. Teachers determine they would like to address English Language Arts–Literacy, Reading: Literacy 4.9 standard: “Compare and contrast the treatment of similar themes and topics (e.g., opposition of good and evil) and patterns of events (e.g., the quest) in stories, myths, and traditional literature from different cultures” (NGA Center & CCSSO, n.d., para. 9). The teachers decide they will have students read several different myths with partners and collaborate to compare and contrast the themes of each myth. Through planning the activities, they decide to use a Google Doc so that students can collaboratively add to a graphic organizer they have designed. The teachers decide this would add to instruction because this would allow

students to record their thinking, add to their partner's thinking, and track the changes they make along the way. One constraint the teachers have is helping the students use their Gmail account to access the Google Docs. They decide to have the media specialist help them with getting students logged on to Google Docs. If this would have been a problem, the teachers may have exited using technology at this point and just gone with pencil and paper or may have decided to use a different digital tool. However, problem solving together can help teachers adhere to using technology with students. Throughout the planning process, teachers reflect at each point to decide if technology will help students reach their literacy goals and how the technology can add to or take away from instruction.

Because of its focus on integrating technology into literacy, the TIPC was a central tool used by the PLC examined in the present study. The TIPC was used to help teachers to overcome barriers that had been cited in previous research such as their beliefs that they do not know how to integrate technology and still teach content standards (Hutchison & Reinking, 2011).

## CHAPTER 3. METHODOLOGY

### Introduction

The purpose of this study was to explore and describe how teachers experience a PLC using the TIPC (Hutchison & Woodward, 2014) to integrate technology into literacy instruction. Most of the research was focused on the processes and actions occurring within PLC meetings and PLC+ sessions (two separate half-day professional development sessions with the researcher). Interviews were conducted to gather data that was unobtainable through PLC meetings, such as teachers' personal beliefs. E-mails, including a questionnaire that the participants answered independently and returned via e-mail (see Appendix A) and other exchanges between the researcher and participants were collected and examined. Also, memos of meetings and meeting transcriptions were taken to capture the essence of meetings. Different sources were used to triangulate the data to ensure reliability of the findings. This chapter provides the details and rationale of the methodological approach used in this study. This chapter begins by presenting an outline of the study design, the context, and the case, including the participants, of the research study. Next, the process of data collection and data analysis are detailed. Finally, ethical issues, goodness and trustworthiness, researcher positionality, and limitations and delimitations are explained.

### Study Design

This study focused on the research question "How do teachers experience a professional learning community using the technology integration planning cycle to integrate technology into literacy instruction?" Case study research is the preferred method of study in situations in which the main questions are *how* and *why* (Yin, 2014). The research question explored how complex social phenomena were occurring. In this case, the researcher had

little control over behavioral events, and the focus of the study was contemporary, not historical (Yin, 2014). Examining a bounded case provided rich, detailed descriptions of teachers participating in a PLC aimed at integrating technology into literacy instruction. The next section will outline the context of the case study, including the situation of the study within a larger research study grant.

### **Context of the Study**

When studying technology integration professional development, it is important to consider the context in which the professional development is taking place (Lawless & Pellegrino, 2007). Rich, thick descriptions of the context are important to gain understanding of the processes reflected in the data. These descriptions can help researchers explore what is happening, for whom, and under which circumstances.

The context of this study was a suburban school district in a midwestern state. The district is one of the top 10 largest school districts in the state, serving over 10,000 students with almost 1,500 staff members. The district was growing rapidly, recently adding an additional high school, middle school, and elementary building. Staff and students in this district were often recognized for academic and professional achievements. The high school graduation rate was 94.2%. This study examined the experiences of three 5th-grade teachers from a single school participating in a PLC focused on integrating digital technology into literacy instruction.

### **Situation of Case Within a Larger Study**

This study took place within The Technology Integration Project, which examined how teachers in a mid-sized school district integrate technology into their classroom instruction. The larger study focused on providing professional development on the use of

the TIPC to help teachers increase and improve the quality of their technology integration. Through this larger study, data collection took place over the course of a single school year at all schools that electively participated in the study. All teachers participating in the larger study participated in a professional development workshop on the TIPC. This workshop was also provided to key school personnel. The next section will describe the bounded case in which this study took place, including the site selection and participants.

### **The Case**

For this study,  $\Theta$  (theta), which is the bounded case (Stake, 1995), consisted of one group of teachers teaching in the same grade level within the same building. Three 5th-grade teachers worked together as a new PLC throughout the 2014–2015 school year. Two of the teachers had taught together previously, and one teacher was new to teaching at that grade level. Characteristics of each of the teachers are described later.

### **Site Selection**

This study took place in a suburban elementary school (Green Elementary, a pseudonym) in a midwestern state. The majority of students in this elementary school were identified as White, non-Hispanic, and 5% identified as Asian/Pacific Islander, 5% as Hispanic, 4% as multiracial, 3% Asian, 2% Black, non-Hispanic, and 0.9% Native Hawaiian or other Pacific Islander. Approximately 22% of the students paid reduced lunch prices, compared to the district's average of 14%. All students at the fifth grade level had received Chromebooks the previous year. Teachers were provided professional development on how to set up the Chromebooks and distribute them to students. Professional development on how to use the Chromebooks for instruction was not offered through the district until the summer and was optional training for teachers.

Teachers throughout the district were invited to participate in the research study at the beginning of the school year as part of a larger project called The Technology Integration Project. Teams of teachers, or PLCs, were encouraged to sign up together. Every teacher participated in a professional development workshop on how to use the TIPC to plan instruction. The professional development workshop took place after school. If teachers were unable to attend after-school trainings, they could participate in online training. Through the professional development workshop, teachers were provided with examples of long-range literacy and digital literacy lesson plans and were guided to create their own. As part of the larger project, teachers were e-mailed weekly sample lesson plans that were created using the TIPC. The lesson plans included examples of how to integrate digital technology into literacy instruction that targeted English Language Arts CCSSs. The plans that were e-mailed represented different grade levels. Therefore, teachers could adapt the lessons for their specific grade level and student needs.

This study focused on one group of teachers from Green Elementary involved in the larger study. Teachers participating in the present study met weekly as a PLC to discuss instructional goals for their students and to plan instruction that involved the use of technology for learning. The content and format of the weekly meetings varied according to the needs of the PLC. For example, if the PLC needed to plan for science or social studies content, the PLC meeting might revolve around deciding which concepts to teach and which materials to use. The researcher met with the PLC weekly to support them in developing instruction into which technology was integrated.



## Participants

The PLC in this study consisted of three participants, Craig, Donna, and Laura (all pseudonyms), who taught fifth grade at Green Elementary. This PLC was selected because of (a) the researcher's familiarity and cordial relationship with the PLC, (b) the participants' desires to focus their PLC on improving their technology integration, and (c) the 1:1 Chromebooks that were implemented the previous year without professional development on how to use them instructionally.

The technology available for this PLC consisted of one Chromebook for each student, one iPad per classroom, one laptop for each teacher, and an ELMO projector in each classroom. Craig and Laura had implemented the use of Chromebooks with their fifth grade students the previous January. This was Donna's first year with using 1:1 Chromebooks for instruction.

**Craig.** Craig was a teacher of 12 years who taught both middle school language arts and fifth grade. He had been in the same PLC with Laura for 4 years. According to Craig's interview, he saw himself as a self-starter when it came to integrating technology. He was a member of the district's technology task force. The task force was a problem-solving group open to the community, and it helped to lay the foundation of district work in technology. Craig often tried new tools out before his teammates, although he sometimes saw this as a disadvantage, as he spent class time with students learning to navigate new tools.

Craig saw his role as a PLC member as trying suggestions that had been provided through the larger project (The Technology Integration Project) in which the teachers were participating. He would then share his successes, as well as what did not work well, with the rest of his PLC. When planning for instruction, Craig believed that student choice was

important. Craig expressed his beliefs about technology integration in the following statement, explaining,

I see that it's very helpful. It can be very fun. It can definitely lead to kids understanding their learning better. I mean that's what the research says, so I believe that. Yeah. I think it can be really useful. (Interview, May 29, 2015)

**Laura.** Laura was a teacher of eight years who taught third through fifth grades. In her interview, Laura stated that she contributed to her teammates by trying something new with technology every day and sharing what she tried with her team. Laura served as the fifth grade representative for the building's instructional leadership team, a team that helped plan and deliver professional development for the building. She gave students many choices for creating and sharing what they learned through digital tools. Laura often helped other teachers solve problems they had when trying to use digital tools. According to her interview and statements she made during PLC meetings, she did not see herself as a planner but more as someone who jumped in to try new things.

Laura believed that the purpose of a PLC was to be a support system in developing a common curriculum as well as helping problem solve around student learning issues. She also viewed the PLC as a way to examine her team's current practices and student progress by reviewing student data. Laura viewed technology integration as something that should be engaging, realistic, and fun for students.

**Donna.** Donna had taught for 17 years, teaching preschool through eighth grade. This was the first year that Donna was participating in a PLC with Craig and Laura. Donna saw her teammates as technology mentors, as this was her first year to use 1:1 Chromebooks with students as well as her first year teaching this grade level. Donna had an extensive

knowledge of literacy instruction, as she held advanced degrees in literacy and had taught literacy courses at the master's level. She saw herself as willing to try new digital tools but felt she had not offered many new suggestions to her teammates because she was so new to using Chromebooks with students. She believed that her role within her PLC was largely as a learner, but that she also had much to contribute in the area of literacy.

### **Data Collection**

Case study research is the preferred method of study for situations in which the main questions are *how* and *why* (Yin, 2014). For this research study, the research question explored how complex social phenomena were occurring. In this case, the researcher had little control over behavioral events, and the focus of the study was contemporary, not historical (Yin, 2014). Therefore, examining a bounded case provided rich, detailed descriptions of teachers participating in a PLC aimed at integrating technology into literacy instruction.

In his book on case study research, Stake (1995) stated that one enters into a case because one is interested in “how they function in their ordinary pursuits and milieus” (p. 1). There is interest in cases both for their uniqueness and for their commonalities. The rich descriptions from this case can serve the *relativist* perspective, which acknowledges multiple realities of a situation (Yin, 2014). Understanding these multiple realities can help researchers, administrators, and policymakers as they design and plan for implementation of new practice. In this case study, participating in a structured PLC process that was incorporating the TIPC (Hutchison & Woodward, 2014) to help plan instruction that integrates digital technology was a new process for teachers. In order to examine this process through multiple realities, or the relativist perspective, data were collected through

observation notes, transcribed meetings, and semistructured interviews with teachers, as well as through e-mails and other artifacts. Two different meeting structures were used during this case study: PLC meetings, which occurred weekly and lasted 25–35 minutes, and PLC+ sessions, which were half-day professional development sessions with the teachers from this study and the researcher. Each are described next.

### **PLC Meetings**

The teachers usually met twice weekly for PLC meetings. According to district documents, PLCs are a vehicle for teachers to work together with a clear focus on student learning. Conversations should revolve around rigorous and viable curriculum, a focus on student data, and a commitment to make instructional changes based on data. Four questions guide the PLC process, which stem from the work of DuFour, DuFour, Eaker, and Many (2010): (a) What do we want students to learn? (b) how will we know if they have learned? (c) how will we respond if students do not learn? and (d) how will we respond if students already know it? PLCs work to develop essential learnings, common formative assessments, and decisions on next instructional steps to ensure that all students learn. According to the district's "Tight and Loose Guide," the definition of curriculum was the board-approved curriculum standards, which were the national standards. The teachers in this study met twice weekly for PLCs, once for literacy and technology integration and once for math.

### **PLC+ Sessions**

Several avenues of professional learning were offered in this district. On Wednesday mornings, students had late starting times. Teachers had an hour during which they focused on professional learning either as a building or as a PLC. Another avenue of professional development was the PLC+ session. These were offered to teams of teachers two to three

times a year. These sections were facilitated by an instructional coach and coplanned with building principals. The teachers in this case study did not have an instructional coach who was working closely with their team. Thus, in lieu of an instructional coach, the researcher provided two half-day PLC+ sessions focused on integrating technology into literacy instruction. These PLC+ sessions were instituted as a result of a need that emerged during regular PLC meetings. The teachers expressed a need for additional time to focus on technology integration. Artifacts and agendas created from the PLC+ trainings, including a teacher-created rubric for student work can be found in Appendix B and C, respectively.

The purpose of the PLC+ sessions was to help teachers learn about the newly implemented English Language Arts CCSSs and set student learning goals accordingly. After learning about the CCSSs and establishing learning goals, the team spent time thinking about instruction and digital tools that may help students reach those learning targets.

### **Sources of Data**

All interviews were transcribed (see Appendix A for survey and interview questions). Some PLC meetings were transcribed, whereas other meetings were simply recorded with detailed notes made during and after each meeting. The dates of meetings, type of meetings, and type of data gathered are presented in Table 1. PLC agendas, observations, field notes, and PLC conversations were also gathered to corroborate data provided by the semistructured interviews (Miles & Huberman, 1994).

Table 1

*Data Collection from Meetings and Interviews*

Date	Meeting type	Data gathered
October 27, 2014	PLC meeting	Notes
October 30, 2014	Individual teacher visit	Notes
November 1, 2014	PLC meeting	Audio transcription, notes
November 25, 2014	PLC <sup>+</sup> <sup>a</sup>	Audio transcription, notes, pictures, documents
December 1, 2014	Teacher interview	Audio transcription
December 2, 2014	Two individual teacher interviews	Audio transcription
December 8, 2014	PLC meeting	Notes
January 5, 2014	PLC meeting	Audio transcription
February 9, 2015	PLC meeting	Audio transcription
February 23, 2015	PLC meeting	Audio transcription
April 15, 2015	PLC meeting	Audio transcription
April 20, 2015	PLC <sup>+</sup> <sup>a</sup>	Audio transcription, notes, pictures, documents
April 27, 2015	PLC meeting	Audio transcription
May 29, 2015	Two individual teacher interviews	Audio transcription
June 16, 2015	Teacher interview	Audio transcription

<sup>a</sup>Half-day professional development.

### **Data Analysis**

As suggested by Maxwell (2005), data analysis began immediately after the first transcribed meeting and continued throughout the study. Initial coding was performed line-by-line to begin with (Charmaz, 2014). These data were then “fractured” (Strauss, 1987), or separated, to look for patterns and then arranged into broader categories. Then data were explored across activity units (Vygotsky, 1978), which for this study was each PLC meeting

and each PLC+ session (half-day professional development sessions). This process was used to explore broader themes that may have been missed through the initial and final coding. Notes and memos were written during these initial readings and as the researcher listened again to interviews and PLC discussions. The themes that emerged from examining activity units were then triangulated with interviews, memos, and themes from the initial and final coding.

### **Initial Coding**

Initial coding was used to examine data word-by-word and line-by-line (Charmaz, 2014). Throughout the initial coding, the researcher looked for gerunds (words that are derived from verbs but function as a noun) and processes that were reflected in the data as the PLC and the researcher worked together. Examples of initial codes that emerged from line-by-line coding are illustrated in Table 2.

Table 2

#### *Initial Codes*

Codes	Codes
Lacking student goals	Creating technology plan
Using prior experiences to support technology use	Asking for help
Building on others' ideas	Problem solving through new digital tool
Using digital tools	Providing expertise
Learning from others' experiences	Lacking time for planning with technology
Desiring focus	Training students on digital literacy skills
No longer using common literacy resource	Changing thinking about technology integration
Lacking use of data	Creating a learning sequence
Seeing role as learning	Setting student learning targets
Seeing role as willing to try new things	Actions reflecting Technology Integration Planning Cycle
Seeing teammates' roles as mentors	Actions reflecting Professional Learning Community framework
Assisting setting up	

As new transcripts were generated from PLC meetings or PLC+ sessions, the iterative process of examining data line by line continued. Through this process, new codes emerged while other codes were left unsupported in the emerging data and, therefore, dropped. For example, at the beginning of the study, the teachers referred to a common literacy resource that had been purchased by the district several years earlier. The code for these references in the data was “no longer using common literacy resource.” This resource was no longer being manufactured and was no longer supported within the district, because replacement materials could not be purchased. As the teachers worked to learn more about the English Language Arts CCSSs and found materials to support teaching the standards, they no longer spoke of the old resource. Although this was important information that informed the study, it was no longer supported on its own as a code or potential theme.

Initial coding took place after each PLC meeting and interview was transcribed. Each line or phrase of data from the transcribed interviews and researcher memos was examined and labeled to summarize and account for that piece of data (Charmaz, 2014). Examples of this coding include “asking for help,” “using prior experiences to support technology use,” and “problem solving through new digital tool.” These codes were determined by looking for processes of what was reflected in the data. Charmaz (2014) suggested using gerunds, nouns that are derived from verbs, to code data when looking for how processes develop, how participants act when involved in these processes, and what the participants think and feel while involved in the process. The initial codes were varied and numerous (over 50 different phrases were used to describe the processes in the data). Data were then reread to look for common themes.



Next, these coding categories were re-examined to develop themes. As this was an iterative process, coding categories were re-examined across all data as well as when new transcripts were examined at the end of each session. A theme is a phrase that describes the processes reflected in the data (Saldana, 2009). Therefore, re-examining the data allowed the researcher to look for larger processes that were occurring as well as processes that would answer the research question of how teachers experience a PLC using the TIPC to integrate technology into literacy instruction. Data pertaining to these themes were examined to look for fit and relevance.

### **Final Coding and Emerging Themes**

As themes began to emerge, the following questions were asked as data were revisited: (a) What are these data a study of? (b) what do these data suggest or leave unsaid? and (c) what theoretical category do these data indicate? Broad patterns occurred through each PLC meeting and explicitly mediated PLC+ sessions. Data were examined for types of trends that were occurring during implicit versus explicit activity, as defined by Vygotsky (1978; see Appendix D). In this study, implicit activity, or instances during which naturally occurring language was used, would be the PLC meetings that were planned and carried out by the teachers. Explicit activity occurred when a more knowledgeable other, the researcher, introduced new tools to shift thinking during the PLC+ sessions. During explicit activity, the researcher introduced the English Language Arts CCSSs and used the TIPC model to focus teachers' behaviors around a common student learning target and technology integration. Data coding was reworked to broadly code the processes of each PLC meeting or PLC+ session. Each activity unit (PLC meeting and PLC+ session) was examined individually (Vygotsky, 1978). As broad activity units were coded, it was important to examine the

processes that were occurring over time. A table was created to examine these processes that were occurring over time (see Appendix D). The use of activity units is explained next, followed by how themes were revised and the resulting themes found for this study.

**Activity units.** Data from this study were used to explore the richness of the experiences of teachers who intended to incorporate technology into literacy instruction. Vygotsky (1978) explained that, in order to study the processes through which tool and sign (mediating artifacts) are utilized, data must begin with the unit of activity. The unit of activity for this study was defined by meeting types: each PLC meeting or PLC+ session. The final process for coding data included examining the use of mediating artifacts, or signs and tools. The use of sign and tool at each meeting was explored, along with the meaning, processes, and PLC implications. Other forms of data were included to provide background and give richer descriptions and triangulate the data of the processes occurring during the PLC meetings.

**Final themes.** As themes were examined across time, a story emerged from the patterns. The use of time during both implicitly and explicitly mediated activity came into question. Due to this questioning, data were tallied with a frequency count according to topics that were emerging from the data. The emerging topic codes were the following: PLC process, resources, and other. As codes were generated, it was noted that the majority of time from one PLC meeting especially fit within its own category: paperwork. Thus, data from all PLC meetings and PLC+ sessions were coded under one of these four categories to determine how time was being spent during both implicit and explicit mediation. The final themes tell the story of the experiences of the teachers in a PLC using the TIPC model to integrate technology into literacy instruction.

### **Ethical Issues**

Several ethical issues must be explored before entering a field site of research (Maxwell, 2005). These issues include, but are not limited to, reciprocity, power imbalances, and confidentiality. Due to the nature of the researcher's position in the district, these three issues were especially important to consider. All of these issues are addressed here.

Reciprocity is the extent to which researchers give back to the participants in the study in return for their time and effort as participants (Maxwell, 2005). In this study, participants spent their time doing interviews and participating in PLCs that included a component of technology, which may have been an added component to their regular conversations. In return, from this participants gained ongoing support through weekly resources and ideas for technology integration, sample lesson plans for integration, and access to additional iPads and apps; received help developing academic goals related to technology integration; and participated in a PLC that was focused on technology integration in literacy instruction.

A power imbalance in a study can potentially marginalize participants (Maxwell, 2007). Oftentimes the role of an instructional coach is misunderstood and seen as an administrative role. This can often lead to assumptions from outside parties that an imbalance of power may be taking place when an instructional coach participates in a PLC with other teachers. In the school district in which this study took place, the instructional coach was actually a teacher and comember of PLCs. Although the coach may have had some expertise in certain areas, it was the classroom teachers who needed to be the experts in knowing their students and understanding the curriculum. The instructional coach (also the researcher) and teachers were partners. They worked together to gain a better understanding

of instructional practices, curriculum, and how students responded to both. It took reflection and awareness on the part of the researcher to ensure that participants from this study held the same partnership view as the researcher/instructional coach did.

Finally, confidentiality was important to maintain in order to protect the anonymity of participants (Maxwell, 2007). Steps were taken to retain the anonymity of the participants by using pseudonyms for each participant, removing personal identifiers from data, and keeping audio recordings and documents in a secure area. Only the researcher and the doctoral program of study committee coauthors had access to the data.

### **Goodness and Trustworthiness**

Validity of qualitative research is crucial. Creswell (2007) proposed several ways to validate, or provide accuracy in, qualitative research. Incorporated into this study were building trust with participants and learning the culture; triangulating the data; clarifying researcher bias; and using rich, thick description. How each of these were used in this study is described further.

Creating accuracy by building trust with participants can be accomplished by prolonged engagement and observation in the field (Creswell, 2007). In this study, the researcher was working with participants from a district in which she had worked for over 10 years. Although at the beginning of the study she previously had not worked directly with all the participants, she had interacted with most of them through grade-level meetings, district training, or graduate classes. Having a positive relationship allowed for individuals to express vulnerability (DuFour & Eaker, 1998), which is especially important when working with new concepts such as integrating technology using the TIPC. Honest conversations allowed real issues to present themselves during PLC conversations and interviews.

Triangulating the data was accomplished through the use of multiple data sources to provide corroborating evidence (Creswell, 2007). Semistructured interviews provided a large part of the data. Moreover, PLC conversations and artifacts, such as agendas, products of PLC work, and field notes, were used to provide additional data to support emerging themes and ideas.

Reflexivity, or clarifying research bias, means that the researcher reflects on biases, predispositions, and preferences he or she brings to the work (Maxwell, 2005). The researcher acknowledged that she had an impact on the environment in which she was conducting research. Being reflective of this was important as data were analyzed to look for patterns and themes.

Finally, using rich data (Maxwell, 2005) can produce a full picture of what is going on. In order to answer the research question “how do teachers experience a professional learning community using the technology integration planning cycle to integrate technology into literacy instruction,” rich descriptions of the characteristics of the PLC itself (i.e., how long members have worked together, background experience, desire to use technology, etc.) was one important description to include. Rich, detailed data provided the study with a better understanding of the findings.

### **Researcher Positionality**

An important part to qualitative research is reflexivity, or self-awareness within the study (Creswell, 2007). As a member of the school district in which the study took place, the researcher was situated as both a PLC member and the researcher. The researcher was aware that bringing her background into a PLC conversation may have shifted the direction of teacher focus as well as conversation and learning. Also, having PLC meetings at the

campus where she worked contrasted with PLC meetings in which she was not as familiar with staff members. Although the aim of PLCs is to sustain the learning of all professionals within the school community (Bolam et al., 2005), this could not have occurred without establishing trust (DuFour & Eaker, 1998). The presence of a new, unestablished member may have affected conversations and learning.

### **Limitations**

A limitation of this study was the small number of participants as well as the participants self-identifying as being interested in learning about the TIPC model. The participants were selected based on (a) the researcher's familiarity and relationship built with the team and (b) participants' desire to focus the PLC process and TIPC around literacy instruction. Carrying out a study over a long time span provided a clear picture of how participants interacted with each other, learned about content and technology, and developed as a PLC team. Thus, generalizations about the findings in the study are limited and not necessarily representative of the larger population or the general teaching population. Where outcomes are suggested, there is no evidence that this could be replicated across other contexts.

A second limitation of this study was potential researcher bias. However, to minimize this, data were collected through recordings and transcriptions of meetings. As themes were generated, continuous analysis of the data was used to either saturate themes or discard themes that were unsupported. Multiple interviews were conducted to clarify teachers' points of views and ideas on beliefs about PLCs, technology integration, and literacy instruction.

## **CHAPTER 4. RESULTS**

### **Introduction**

The purpose of this case study was to explore how teachers experience a PLC using the TIPC to integrate technology into literacy instruction. A case study approach (Stake, 1995; Yin, 2014) was used to explore the data and provide rich descriptions of the phenomena reflected within the data.

Three major themes emerged from the data: difficulty setting instructional goals, time, and changes in teachers' thinking and actions. In this chapter, each theme is explored in light of the overarching research question for the present study: How do teachers experience a professional learning community using the technology integration planning cycle to integrate technology into literacy instruction?

### **Theme 1: Difficulty Setting Instructional Goals**

The first theme to emerge was difficulty setting instructional goals. The first step in the PLC process, as proposed by DuFour (2004) and adopted by the school district leaders in the present study, was determining what students should know and be able to do. Similarly, the first step in the TIPC (Hutchison & Woodward, 2014), which guided the work of the PLC in the present study, was setting an instructional goal. According to Hutchison and Woodward (2014), who created the TIPC, "whether the teacher is using this model to plan instruction for a whole unit or a daily lesson, the instructional goal should be the first consideration" (p. 459). Thus, it is not surprising that ideas and conversations around setting goals were prominent during PLC meetings. Despite the importance of determining what students should know and be able to do and then setting instructional goals accordingly, the teachers experienced difficulty in setting goals for students. This difficulty was present from

the beginning of study and continued over time. During a PLC meeting in November, the teachers realized that they needed support to better integrate technology into their instruction. Thus, they began to plan for a PLC+ half-day training session in which they would work with the researcher to plan instruction that integrated technology. They began their planning by discussing how the content of the PLC+ session may focus on how to integrate an app they had found in a magazine. They were focusing on digital tools as a starting point for planning instruction rather than first determining what they wanted their students to know and be able to do. They also discussed other resources they may need for planning during the PLC+ half-day training session, such as books about technology, which included lesson plans to go along with the technology. This focus on digital tools and resources rather than instructional goals is indicative of the way these teachers were trying to bring technology into their instruction and explains why they had difficulty setting instructional goals. When asked about what they were currently working on with students, the teachers cited different activities they were doing, such as book clubs, but did not share their teaching goals. When asked if they were working on similar or different skills with students, Craig answered, “Totally different.” Donna’s response was:

I think we need a scope and sequence. I think we were just having this conversation today about my huge concern with ELA [English Language Arts], talking about not doing any kind of scope and sequence or any kind of curriculum. . . . I think we, as teachers, need at least a starting [point]. I know we’re supposed to teach our kids what they need, but we need something to help us just begin to start teaching and know what to assess. (PLC meeting, November 17, 2014)



The researcher decided to work with the teachers on the process of setting goals by introducing the English Language Arts CCSSs during a PLC+ half-day training session in November. The school district had not yet adopted the English Language Arts CCSSs, yet the teachers were no longer required to use the basal curricular resource that had been used several previous years. The teachers believed that the current literacy standards from the district were too vague on which to base their instruction. These factors—not yet adopting the English Language Arts CCSSs and not having a common curricular resource—created the reason that teachers had difficulty setting instructional goals. Thus, the PLC+ session, which provided extended time for PLC members to work together on a common goal, created a unique opportunity for the PLC members to consider a coherent sequence for their instruction and to set instructional goals.

### **Introducing a Common Tool for Goal Setting**

For the first PLC+ half-day training session in November, the teachers were asked to bring data from a district-administered assessment. When asked about the data, the teachers talked in vague terms about the reading behaviors that students lacked. So that they could set clear learning goals, the teachers were asked to decide on learning targets for students for the end of 4, 6, or 8 weeks. In order to determine clear learning targets, they needed to have a common understanding of the learning goals. Thus, the teachers determined that they would use the English Language Arts CCSSs and a planning tool provided by the district called A Network of Process Systems for Reading (Fountas & Pinnell, 2014; see Appendix E). This planning tool is a diagram that displays reading behaviors that students use as they navigate through text. For example, when thinking about a text, a reader may analyze or critique the text. When thinking within the text, a reader may infer, synthesize, or make connections as

he or she reads. The teachers used A Network of Process Systems for Reading diagram (Fountas & Pinnell, 2014) as a starting point for setting learning goals during their first PLC+ session.

During this PLC+ session, the researcher guided the teachers through each step of the TIPC, including planning for instruction, determining which tools may help students reach their learning targets, and exploring both affordances and constraints of the tools. Although the teachers had been introduced to the TIPC model at the beginning of the study, they had not yet engaged with the cycle from beginning to end to plan instruction they would use in their classrooms. To set instructional goals, the teachers worked to make connections between A Network of Processing Systems for Reading (Fountas & Pinnell, 2014) and the English Language Arts CCSSs. The teachers sought to find a way to teach the state English Language Arts CCSSs while also engaging students in the reading behaviors described in Fountas and Pinnell's (2014) A Network of Processing Systems for Reading diagram. The teachers used dialogue and prior classroom experiences to begin to form a common understanding of the English Language Arts CCSSs. For example, Donna asked Laura what she meant by author's craft from one of the standards. Laura responded by stating,

I'm sorry. The writer's craft, text structure and the kids. . . . I'm thinking about those questions that are at the end, like, "Why did the author choose . . ." I was trying to figure out which of those craft and structure ones really hits the best. I thought six, but I don't know. I could be swayed. (PLC+ transcript, November 25, 2014, p. 5)

By asking questions and sharing ideas and prior experiences, the teachers built a common understanding of the standards through dialogue. When Laura stated that "she could be

swayed either way,” it appeared that she was open to listening to everyone’s ideas before deciding on an interpretation of the standards.

By the end of the first PLC+ half-day training session, the teachers were finally able to create a shared instructional goal. They decided to focus on Common Core Standard Reading: Literature 5.9: “Compare and contrast stories in the same genre (e.g., mysteries and adventure stories) on their approaches to similar themes and topics” (NGA Center & CCSSO, n.d., para. 9). Although a primary aim of their PLC was to learn how to better integrate digital technology into their instruction, the teachers were unable to focus on how to integrate technology because they had difficulty setting an instructional goal to start with. However, the process that they went through as a group to select and set appropriate instructional goals brought them one step closer to meeting the goal of integrating technology into their instruction.

### **Setting Student Goals Not Yet Internalized**

Despite the strides that the teachers made toward setting instructional goals for their students during the PLC+ session, it was clear at the next regularly scheduled PLC meeting that the teachers were still not in the habit of beginning their planning with the instructional goal; instead they set their goals based on the technology they wanted to use. During this meeting, the teachers were discussing the final project for their current instructional unit. The following excerpt is from the researcher’s memo for that PLC meeting (December 8, 2014):

When Craig came into the room, they got started with thinking about the end project. Donna suggested having a research poster that would be printed off at print shop to display. Craig suggested having students look at real rocks and classify them. The

team tried to decide how they would classify the rocks. Laura shared a way she had had students go through videos to figure out which ones would be most beneficial for classmates, post to a Padlet, and share why they were the most beneficial.

I pulled up the Iowa Core for Science. Craig suggested looking at sixth grade and above standards to see what students would be expected to know and be able to do.

Each teacher had the Internet pulled up, looking for different resources.

I suggested a Glogster, so not all students would have to print off a poster. Teachers were hoping to have some work that could be displayed. “Everything they do is on the computer now. The work we have displayed currently is from September.”

Is there a way to help this team think about the end goal for their students? Is there a way to tie in the science processes that are included in the core? I might bring these pieces to their next PLC meeting. In the end (where we always get stuck) is having clearly defined student outcomes. This should be driving what we are having students engage in. That is what I will bring to the team next time.

The interactions during this PLC meeting indicated that the teachers in this group had not yet internalized the TIPC or the PLC process. They began with a project in mind without first determining what they wanted students to know and be able to do. This lack of focus on instructional goals made it difficult for the teachers to determine the content of the final project.

### **Goal Setting Becomes Internalized**

As the teachers continued to focus on setting student learning goals, they became better able to begin their instructional planning with the learning goal rather than letting it be determined by the technology they wanted to use. On two separate occasions, the teachers demonstrated this change. The first instance occurred during a PLC meeting on April 6, 2015. The teachers were deciding on a focus for their upcoming PLC+ half-day training session. The teachers started to think about different writing genres they had not yet covered, as well as different text genres they had not covered. Early on in the conversation, Craig stated, “The way we came up with Tuck [the unit] was . . . didn’t we start with a standard first?” (PLC meeting, April 6, 2015). Later, he brought the teachers back to the student learning goal by asking, “How do you think your kids did with the text evidence and citing? Citing sources, citing text evidence and page numbers and things?” (PLC meeting, April 6, 2015). As part of his participation in the PLC, Craig helped the other teachers to begin with a student learning goal rather than starting with a digital tool or learning activities.

The second instance in which the teachers demonstrated their shift in thinking about goal setting and beginning their planning with instructional goals occurred during the second and final PLC+ session. The final PLC+ half-day professional development session took place at the end of April. During this training, Donna helped the group to focus on the first step of the TIPC: setting a student goal. After initially settling in to the PLC+ session, Donna asked, “What were we thinking as far as standards?” to get the teachers thinking about student learning targets for the next unit they were planning. The following excerpt illustrates the dialogue between the team:

Donna: Okay. The one thing I was thinking for sure like what Craig said was I know we already did it. We did compare and contrast. Mystery is all about inferring. Who are you thinking is of a mystery to solve? Who is the bad guy? I thought for sure we could cover that.

Laura: This one. “Quote accurately from a text when explaining what the text was explicitly and derive the inputs from the text.”

Donna: Which one was that one?

Laura: Standard One.

Donna: Key Ideas and Details.

Laura: The standard is “Read closely determine what the text says specifically and make logical inferences. Site text evidence.”

Donna: Fifth grade “quote accurately,” and then seventh grade is “several pieces contextual evidence to support analysis of both the text.” (PLC+ Part 1 April 20, 2015, p. 6)

In this example, teachers used the common tool of English Language Arts CCSSs district documents to begin talking about student goals. The teachers clarified the standards they wished to work on with students and then began to consider what would serve as evidence that the students had met the standard. They determined that the best way for students to show text evidence of elements of a mystery was to have a common chart for them to fill out, including indicating page numbers from where they found the text evidence. At this point, consistent with the TIPC, the group was able to consider how they could integrate technology to enhance the lesson, make it more interesting, or introduce additional digital literacy skills. Laura asked if anyone knew of a fun way for the students to video

record their information, and Craig suggested a video diary. Laura described a first grade unit she had seen on the Internet that included a blog about a mystery unit. From here, the teachers brainstormed different tools, their affordances, and their constraints. At this point, Craig was able to tie it all back the tool to the student learning goal. This was the first evidence of this group of teachers using the TIPC in which the student goal was set first and then a digital tool was selected to enhance the learning goal. It was not clear whether this was a conscious effort of using the TIPC model or whether previous work with the researcher helped them to start with the student learning goal first. The goal of the TIPC is that teachers will internalize it as a way of thinking when they plan instruction involving technology, and it seems that the teachers in this PLC were able to do that. However, it was a nearly year-long process for them to get to that place.

### **Theme 2: Time**

The second theme to emerge from the data was how the teachers spent their time during PLC meetings and PLC+ half-day sessions. Time is a scarce resource during a teacher's day. Teachers are being asked to take on more and more tasks without having other responsibilities taken away. In order for teachers to function as a highly effective PLC, they must dedicate time to the often intensive tasks of making decisions, collaborating in meaningful ways around data, and determining common student outcomes (Graham & Ferriter, 2010). Often, teachers find themselves in conflict with taking the time to reflect, learn, and plan around common data points and spending time "getting things done." The time required for these thoughtful conversations is often in competition with the multitude of other tasks teachers must complete. Thus, not surprisingly, the concept of time and four related categories emerged from the data in the present study.

A primary way that time emerged as an important part of the PLC process was that much of the teachers' shared time was not spent responding to the four questions intended to guide the PLC: (a) What should students know and be able to do? (b) how will we know if they've learned it? (c) what will we do if they have learned it? and (d) what will we do if they have not learned it? Rather, often during PLC meetings, teachers spent time on tasks such as finding resources or completing paperwork. For example, during a PLC meeting on November 17, 2014, teachers began sharing different resources to determine the content of an upcoming PLC+. Donna suggested an article from *The Reading Teacher* that featured an app that could be used during literacy instruction. Laura and Craig suggested *Connecting Comprehension and Technology* (Harvey, Goudvis, Muhtaris, & Ziemke, 2013), a resource that provides lessons for various comprehension strategies tied to a digital tool. Similarly, on January 5, 2015, the teachers in this PLC spent time looking for different books they could use with book clubs, searching online for book reviews, and discussing different students' book preferences. The teachers came up with a list of titles in the fantasy genre that would match the teaching goals for the unit. The teachers were trying to match up students with partners from different rooms according to the books students had chosen so they could each read the book they were interested in. Although spending time to find resources is a part of what teachers must do, conducting this work during PLC meetings meant that the teachers were not spending time focusing on any of the four guiding questions intended to guide the PLC.

Teachers in this PLC also spent PLC meeting time filling out paperwork mandated by district or building initiatives. For example, on April 27, 2014, nearly the entire PLC meeting was spent filling out the district's required goal planning sheet and discussing where



to find the necessary documents to complete this work. For example, Craig asked where he needed to copy and paste his goals from one document to another. Laura explained how she had copied and pasted her information from one document to another. The conversations focused only on how to find and upload documents. Student learning targets, teaching strategies, and addressing student needs were not addressed during this meeting.

During many PLC meetings, the teachers' conversation drifted to topics that were not related to the goals of the PLC (i.e., topics that did not address the four questions of a PLC). Dialogue during meetings was peppered with off-topic conversations. For example, during a PLC meeting on January 5, 2015 the play *Into the Woods* (DeLuca & Marshall, 2014) was discussed as a possible resource to use with the students. The conversation drifted to discussing the movie and then different movie theaters in the area as well as actresses in the movie. During another point in the conversation, a teacher shared about a student who did not need to make up district assessments. This conversation led to off-topic points about different expectations for assessments in different buildings. During other meetings, a lot of time was spent locating documents or discussing other district initiatives.

To provide a broad look at how time was spent during PLC meetings, transcripts from PLC meetings were coded to mark whether conversations during PLCs were guided by the four questions intended to guide the meetings or spent on other tasks. A breakdown of how PLC time was spent is shown in Table 3. As shown in the table, less than half of the PLC meeting time was spent on topics intended to be part of the PLC process. Over 30 percent of the teachers' time was spent on other tasks related to teaching and working in an elementary school. Almost one fourth of teachers' time was spent on finding resources to support instruction, and a small portion of time was spent on paperwork. These findings of how

Table 3

*Frequency of Time Spent*

Activity	Frequency count	Percentage
PLC process	94	41.7
Resources	54	24.0
Other	69	30.9
Paperwork	6	2.60

teachers' PLC meeting time was spent is particularly important given that the PLC met only two days per week for about 45 minutes each week throughout the school year. While this PLC was supposed to be guided by a specific process, the teachers in this study were required to fulfill many responsibilities, for example filling out paperwork, which sometimes took precedence over that process. Thus, this study reveals the need for PLCs to be guided by clear goals and for time to be focused and intentional.

### **Theme 3: Changes in Teachers' Thinking and Actions**

The final theme to emerge from the data was changes in teachers' thinking and actions. This theme illustrates how participation in this PLC helped teachers to think about technology integration differently and to take different actions as a result. This shift began to emerge after the first PLC+ session in November. The teachers were interviewed to gain an understanding of how they thought the PLC was going and how they were thinking about using the TIPC to plan instruction. During this interview, Craig stated that the TIPC had changed his thinking about technology integration: "Yeah, it brings [technology integration] to the forefront a little bit more. I'm thinking about it more and trying to be more objective with it" (Interview, December 1, 2014). Yet, Craig also felt his PLC did not spend a lot of time thinking about how technology would help accomplish students' learning goals, saying,

“I think that’s the other thing, too, that’s the time issue. It doesn’t seem like a priority in our PLC meetings to go over each and every path [for using technology with students]”

(Interview, December 1, 2014). Rather, they spent a lot of time on other topics such as finding other resources, as illustrated previously in the discussion of the theme of time.

Laura, during her interview in December, explained that the TIPC with her PLC had helped her and the other teachers determine whether a tool contributed to or constrained instruction, which is related to the fourth step of the TIPC. Because they were guided by the TIPC, Laura reported that she and the other PLC members spent time trying to solve potential problems before using the tool with students. Laura commented:

For example, Donna did Sketchpad for something, visualizing, maybe, and then she said that sometimes the tool bar disappeared and sometimes it would crash on them, and it would save it, so she kind of warned me, but I still used it. But then when those things happened, I wasn’t surprised and the kids weren’t surprised, because I had already kind of warned them that this might happen, so they were prepared that if they lost it they might have to start over, so things like that. (Interview, December 2, 2015)

Donna expressed that engaging with the TIPC had helped her to think more critically about how she integrated technology. For example, in her interview she stated:

It’s not about the technology. It’s still about the learning goals. I always catch myself getting caught up in, “Oh, this is a really cool app! I need to show them that.” And then I’ll step back and say, “Well, how is that helping me get my job done teaching them the core standards?” I think it’s helped me feel okay to say, “It doesn’t have to be in everything we do all day long.” (Interview, December 2, 2015)

These changes in thinking that the teachers reported were also clear in their actions during PLC meetings. Early on in the present study, when technology was brought up during PLC meetings, it was often to suggest a digital tool or to share how a tool worked or did not work. These suggestions were helpful for teachers in problem solving. For example, during a PLC meeting on December 8, 2014, the PLC was determining what to teach for the science topic of rocks. They started with thinking about the end project. Laura shared a way she had students go through videos to figure out which ones would be most beneficial for classmates and post the videos to Padlet, an app that allows students to post pictures, videos, and comments. Students had to share why they believed the videos were the most beneficial. One teacher pulled up the district science standards, but the rest of the teachers focused on the end product. One teacher wanted to have the end product be something that could be displayed in the hallway because they still had student work from September displayed.

Later, the teachers' approach to using digital tools began to change. During the first PLC+ training session, the teachers, along with the district technology curriculum coordinator, discussed various tools they could use to help students compare and contrast two different texts in the fantasy genre. This was the student learning target they had initially set before thinking about digital tools. Through dialogue, the teachers explored possible uses for digital tools with students as they related to the learning outcome. For example, Donna had the idea of having students answer questions using a blog post. Laura added to this idea by offering specific questions they could pose. Through this conversation, the teachers discussed different digital tools they could use to support the student learning goal. This discussion also led to the digital literacy skills students may need to complete the blog post or digital literacy skills they already possessed.

Through dialogue, the team thought about the advantages and disadvantages of setting up blogs in different formats. For example, having a common blog site for all fifth-grade students would open up communication among the fifth grade students. Donna talked about how students could blog about what is the same and what is different about their book and the mentor text, *Tuck Everlasting* (Babbitt, 1975), which related to the learning goal. These conversations reflected a shift from teachers' initial meetings, in which they focused on using digital tools rather than on their learning goals. This shift likely was partially due to teachers' improved abilities to set instructional goals for their students, which improved through their participation in the PLC.

Another indicator of changes in teachers' thinking is that they at times chose to exit the TIPC and not integrate technology into their instruction when it did not support their instructional goal. This shift represents a new way of thinking about technology integration. One example of this occurred when two teachers were deciding whether to have students blog or do a quick write with pencil and paper. In an interview, Laura explained:

I had the kids coming back from Thanksgiving; I wanted them to blog because I had a purpose of wanting to talk about blog commenting and what those might look like—and not just one or two words or smiley face. So that was my purpose. So I wanted to use the technology, whereas Donna said, “I wanted them to come in and do a Thanksgiving kind of reflection,” and she said, “I first thought blog, and then went, no because I want it to be a quick write, and I don’t want the typing to be an obstacle.” Then you have to think about that cycle, which I am sure she wasn’t thinking about, but that escape route of saying, “Nope, technology isn’t what I want right now, because I need them to just write,” because she was looking for a different

purpose. So I thought that that was kind of an example of when we've used it may be kind of subconsciously, not really thinking about it, but just that idea of, "Well what do I want, and then is technology going to fit into this plan or not?" (Interview, December 2, 2014)

Laura's interview excerpt demonstrates how these teachers went from just using technology whenever they could to being more intentional about their use and considering it in light of their instructional goals. The teachers expressed the idea that planning instruction with the TIPC helped them to feel the freedom to make those kinds of instructional decisions. For example, in a mid-year interview about her use of the TIPC, Donna stated: "It's helped me feel okay to say, 'It doesn't really work here. But it works really great here.' And that's okay. It doesn't have to be in everything we do all day long." (Interview, December 2, 2014).

Although the teachers' thinking was changed by engaging with the TIPC, by the end of the year the teachers still perceived that they needed more change. When asked during his end-of-the-year interview about whether the TIPC changed his teaching, Craig responded,

No. Unfortunately, not enough. I'd like to have it be more so. It depends too . . . if I do more meaningful, fewer projects; then it'd be I'd plan a lesson and might be in there or it might not be in there. I almost feel like maybe it's more unit oriented rather than lesson oriented.

For Laura, the TIPC changed her thinking but not necessarily the actions that went on during a PLC meeting. She stated:

It's a little more structured in your . . . talking out loud versus me just going, "Okay, here's what I need to do. How am I going to get there? What do my kids know how

to do? Should we do something new? Should we use something we've already used?" . . . But I think it's more of an internal conversation. (Interview, May 27, 2015)

For Donna, it wasn't necessarily the theory, the diagram, or the instructional framework of the TIPC that helped her the most. She noted,

I would say that being part of the study of that framework hugely influenced my classroom instruction. It helped me see probably a little bit more than I would have on my own the benefits of incorporating technology. I think it forced me to learn more apps or more websites that I could use. (Interview, July 12, 2015).

These reflections illustrate changes in the teachers' thinking and actions in that technology was brought to the forefront when planning instruction. These reflections also illustrate that using the TIPC model helped teachers to think critically about the affordances and constraints of technology tools. The teachers were also able to exit the TIPC model when technology did not fit the instructional goal. The teachers explained during interviews that they saw value in participating in a PLC whose aim was to integrate technology into literacy instruction. Participating in this study provided a useful framework and ideas for technology integration. Yet, the teachers still felt their PLC could spend more time thinking about how technology would help accomplish students' learning goals. Doing fewer, more meaningful projects and focusing on actions during a PLC meeting were actions to continue to work on, as stated by the teachers.

## CHAPTER 5. DISCUSSION

The purpose of this study was to explore how teachers experience a PLC using the TIPC to integrate technology into literacy instruction. One finding of this study is that PLCs are a form of professional development through which teachers can engage collaboratively to integrate technology into their literacy instruction. This finding has been supported by other researchers (Curwood, 2011, 2014; Hughes et al., 2005). Using case study methods for this study was the best fit, as these methods allowed for examining experiences as they unfolded over time (Stake, 1995; Yin, 2014). Analyzing and coding data in this way allowed for themes to emerge. Themes were either supported by ongoing data collection and analysis, or they proved to be unfounded or insignificant as new themes emerged. This study used social development theory (Vygotsky, 1978) as the conceptual framework. In social development theory, mediating artifacts, or tools and signs, are used for explicit mediation. Explicit mediation occurs when a “more knowledgeable other” is helping individuals to learn a new way of thinking or develop new knowledge. Implicit mediation occurs when individuals have internalized the tools and signs and new knowledge or behavior has been established. Exploring implicit and explicit activity over the course of a school year was important to this case study for two reasons. First, it allowed for the examination of what occurred during a typical PLC meeting for teachers. Being able to examine how teachers used time during PLC meetings, and what the focus of these meetings were, was useful because it allowed a view of how teachers functioned in PLC meetings as they normally occurred. Second, it allowed for the examination of how explicitly mediated activity changed teachers’ thinking and behavior over time. In this chapter, the themes of difficulty setting instructional goals, time, and



changes in teachers' thinking and actions are discussed. Then, reflections are provided, including ideas for professional development and future research.

### **Discussion of Themes**

In this section the major themes from this study and their significance are explored. The research question for this study was, "How do teachers experience a PLC using the technology integration planning cycle model to integrate technology into literacy instruction?" Three themes emerged from the data: difficulty setting instructional goals, time, and changes in teachers' thinking and actions.

#### **Difficulty Setting Instructional Goals**

At the beginning of this study, teachers had a difficult time setting instructional goals for students during PLC meetings. As such, time spent during their PLC meetings was not usually focused on the PLC process. This made using the TIPC difficult for teachers to use. It was apparent, even in December after the first PLC+ session, that setting goals had still not been internalized by teachers when they began a PLC meeting with determining activities for students during science rather than starting with the end goal for students. It was only after teachers became familiar with the English Language Arts CCSSs that goal setting became an internalized process. Then teachers were able to independently begin with setting student goals as they worked to integrate technology into literacy instruction.

Much of the literature around technology integration ties student learning goals to the integration process (Cifuentes et al., 2011; Curwood, 2011; Hughes et al., 2005; Hutchison & Woodward, 2014). The PLC process itself begins with determining what students should know and what they should be able to do (DuFour & Eaker, 1998). Without instructional

targets, teaching is like shooting random arrows in the dark. It is impossible to know what to look for or teach, let alone define success for students.

Setting goals in literacy may have been difficult for this group of teachers because of two factors. First, the district in which the teachers worked had not yet officially adopted the English Language Arts CCSSs (NGA Center & CCSSO, 2010). Second, the teachers were no longer required to use the curricular resource that had been previously required for the previous 7 years. Although this left teachers free to explore new materials and new ways of teaching, they were working from vague literacy standards provided by the district. Without common ground on which to build common literacy goals, the teachers in this study had a difficult time organizing their PLC meetings. This conclusion is based on conversations with the researchers involved in The Technology Integration Project, the larger grant study in which the present study took place, as well as memos based on the first two meetings with the teachers in this study in which they reported their difficulty with having a common focus because of the change in curriculum. Introducing the English Language Arts CCSSs through explicitly mediated activity provided the teachers with time to build a common understanding of what their students should know and be able to do. Through common dialogue during PLC+ sessions, they worked together to build common learning goals for students. They later internalized this process. This was evident when the teachers were planning for their final PLC+ half-day professional development session. The teachers began talking about different activities in which they wanted the students to engage when Craig brought the teachers back by stating, “Wait . . . the way we came up with [the last unit] was . . . didn’t we start with a standard first?” (PLC meeting, April 6, 2015). Also, as the teachers engaged in

the final PLC+ half-day professional development session, Donna made sure to start the teachers with the standards they wanted to focus on with students first.

## **Time**

The emergence of time as a theme occurred as the data were examined through the lens of the four guiding questions of a PLC: (a) What do we want students to know and be able to do? (b) how will we know if they've learned it? (c) how will we respond if they have not learned it? and (d) how will we respond if they have learned it? (DuFour & Eaker, 1998). Along with the four guiding questions, time spent exploring digital tools was included as part of the PLC process, as the goal of this PLC was to integrate technology into literacy instruction. As noted through exploration of the data and Table 3, much of the time conversations did not revolve around any of these topics. This is important, because research has indicated that focusing on the act of teaching and learning with colleagues increases student achievement (Garet, Porter, Desimone, Birman, & Yoon, 2001; Lomos et al., 2011; Strahan, 2003). Teachers in this study spent time on other topics not related to the PLC process such as finding resources and completing compliance tasks as well as on the PLC process itself.

Guskey and Yoon (2009) stated that professional development requires a sufficient amount of time to be successful. It must be well organized, structured, and purposefully directed (Garet et al., 2001; Guskey & Yoon, 2009). Implicit activity in this study (specifically PLC meetings) was often unstructured. Although teachers came to PLC meetings prepared to talk about the same topics, these topics were not always related to the broader community's (i.e., school district's) vision of what should occur during the PLC process. The school district's vision of a PLC was that teachers focus on the four guiding

questions of a PLC as they met together: (a) What should students know and be able to do? (b) how will we know if they've learned it? (c) how will we respond if they have not learned it? and (d) how will we respond if they have already learned it? Relatedly, Dooner et al. (2008) stated that, although PLCs are often promoted as effective forms of professional development, teachers often have a vague understanding of the features of a PLC (such as shared beliefs and interdependence). This creates tension within the group and also causes confusion. Findings from this study support Dooner et al.'s (2008) observations, as teachers in this study spent a large portion of time on other conversations during implicit activity. Teachers in this study all believed that the purpose of a PLC is to provide support for one another in determining how to help students and planning curriculum and common formative assessments. This was found to be true both for curricular support as well as support with using technology in literacy instruction. These findings are supported by other studies (Cifuentes et al., 2011; Curwood, 2014; Jones & Dexter, 2014).

Using social development theory as a lens to explore the difficulties teachers had with adhering to the PLC framework, exposed different components within the context of this study (i.e., the school district and school) that may have contributed to this. First, determining who would perform tasks may not have been clearly defined. It was not clear whether it was the role of the administrator, the Instructional Leadership Team leader, or the teachers themselves to be responsible for making sure the teachers focused on the four guiding questions of a PLC during PLC meetings. Second, there may have not been enough explicit mediation on mediating artifacts, which would have explained the PLC process. In order for teachers to follow the PLC process, they must have a common understanding of what each step looks like, including determining student outcomes, creating common

formative assessments, and interpreting data. Who is responsible for ensuring teachers have the capacity to carry out the four questions as a group? Evidence of who was responsible for these aspects was not present in the data. No clear or established rules seem to have been followed other than teachers met twice weekly—once to talk about literacy and technology integration and once to talk about math and problem solving. At different points during the study Donna and Laura both commented about their team being dysfunctional or needing a focus, but they did not necessarily tie this to a goal of the PLC or building. This suggests that they may not have been aware of the goals of the district or its vision of the PLC process.

Relating the research question for this study to the theme of time could be phrased in this way: How did teachers experience time in a PLC aimed at technology integration in literacy instruction? The definition of “experience” in this question is the issues (Yin, 2014) and processes (Charmaz, 2014) that were occurring as the PLC worked together to integrate technology into literacy instruction. Time itself was spent during PLC meetings and PLC+ sessions on the following topics: PLC process, resources, paper work, and other. Teachers experienced time in different ways according to implicit versus explicit activity.

### **Changes in Teachers’ Thinking and Actions**

In this study, the use of new tools (the English Language Arts CCSSs and the TIPC model) was introduced by the researcher. When someone introduces something new to a group in order to change thinking or behaviors, this is known as explicit mediation (Vygotsky, 1978). Explicit mediation in this study led to the teachers’ ability to navigate goal setting, the English Language Arts CCSSs, and technology integration in ways they were unable to on their own.

Vygotsky (2012) explained that “human mental functions must be viewed as products of mediated activity” (p. xxix). Implicitly mediated activity in this study occurred as teachers participated in PLC meetings. Before the explicitly mediated activity was introduced, teachers expressed a desire to have more focus during their PLC meetings. Without having a common tool or sign on which to focus goal setting, PLC meetings often focused on conversations that were task oriented and did not fit within the realm of the four guiding questions of a PLC, as established by the school district. In this study, introduction of new tools and signs to teachers, in the form of the TIPC and the English Language Arts CCSSs, was accomplished through explicitly mediated activity. Through the lens of Vygotsky’s (1978) zone of proximal development, a “more knowledgeable other,” in this case the researcher, was able to introduce and provide explicitly mediated activity around tools and signs. The tools and signs in this study included the English Language Arts CCSSs and the TIPC (Hutchison & Woodward, 2014).

According to Vygotsky, cognitive ability is not a natural entity, but a sociocultural one (Kozulin, 1998). The product of thinking is not left alone to the individual. Every process appears twice: first on a social level (among people) and, later, on the individual level (internalized individually; Vygotsky, 1978). This study demonstrated how explicitly mediated activity led to a change in teachers’ thinking and behavior. This view helped to answer the research question: How do teachers experience a professional learning community using the technology integration planning cycle model to incorporate technology into literacy instruction. By observing how teachers’ thinking and behavior changed due to explicitly mediated activities, the processes through which these changes occurred were

demonstrated. For example, in regard to teachers' integration of technology into literacy instruction, Donna stated,

It's still about the learning goals. I always catch myself getting caught up in, "Oh, this is a really cool app!" . . . and then I'll step back and say, "Well, how is that helping me get my job done teaching them the core standards?" (Donna, interview, December 2, 2015)

Donna was able to internalize the TIPC after it had been explicitly introduced through the professional development session and later reinforced through the PLC+ sessions. Craig also stated that participating in a PLC using the TIPC changed his thinking about technology: "It brings it to the forefront a little bit more. I'm thinking about it more and trying to be more objective with it" (Interview, December 1, 2014). Laura's change in thinking occurred around how to problem solve with tools by participating in a PLC using the TIPC. By considering the affordances and constraints of a tool, she could consider how other teachers had used it with students and the problems that had occurred for those teachers: "But when those things happened [for me], I wasn't surprised and the kids weren't surprised, because I had already kind of warned them that this might happen so they were prepared that" (Laura, interview December 2, 2014). At the end of the year, Laura stated that using the TIPC changed her thinking personally, but she felt the change with her PLC was more internal: "It's a little more structured in your . . . talking out loud" (Laura, interview, May 27, 2015).

Donna believed that being a part of the study

hugely influenced my classroom instruction. It helped me see probably a little bit more than I would have on my own the benefits of incorporating technology. I think

it forced me to learn more apps or more websites that I could use. (Interview July 12, 2015)

Craig also believed that, at the end of year he was doing more meaningful projects for which technology may or may not be incorporated, depending on the unit he was teaching.

Another example of explicit activity leading to implicit activity was through goal setting. The English Language Arts CCSSs were introduced to the teachers in this study during a PLC+ session. Although one of the teachers had worked extensively with the English Language Arts CCSSs through district committee meetings, the other teachers had done only limited work in this area. Prior to their work with the English Language Arts CCSSs, the teachers did not have a common focus for students during literacy instruction, which made goal setting difficult. The researcher worked with the teachers to build a common understanding of what students should know and be able to do according to the English Language Arts CCSSs and helped the teachers to work in planning two units of study. The TIPC was used as a tool to design the units and to incorporate technology in meaningful ways. At the end of the school year, when the teachers were getting ready for their final PLC+ session, Craig redirected his team to bring them back to a learning goal, rather than focus on different texts. He noted, “The way we came up with [the first unit] was . . . didn’t we start with a standard first?” (PLC meeting, April 6, 2015). Craig had internalized the TIPC with the first step of setting a goal for students. Finally, Donna showed internalization of using the English Language Arts CCSSs to set student learning goals when she helped the other teachers use the standards to set student learning goals before they determined in which activities students would be engaged. The teachers’ experiences with explicitly mediated activity led to the implicitly mediated activity of using the TIPC as well



as the English Language Arts CCSSs. The findings concerning mediating artifacts are important because they demonstrate that explicit mediation is important in supporting teachers in how they function within a PLC and how they spend time during PLC meetings.

### **Reflections**

This study was significant for several reasons. First, the case study examined three teachers participating in a PLC over time. There are few studies that have used longitudinal research, and little is yet known about the potential for establishing enduring, effective PLCs (Bullough, 2007; Stoll et al., 2006). Along with this, research focused on teacher learning and context of PLCs is missing in the literature (Van Lare & Brazer, 2013). Second, by examining implicitly and explicitly mediated activity over time, one can determine how the use of tool and sign, such as the TIPC, can be introduced and used in meaningful ways by teachers. Third, this in-depth case study offers insight into how best to support teachers not only when integrating technology in literacy instruction but also in functioning as a PLC. Several researchers have examined PLCs and technology integration (Cifuentes et al., 2011; Curwood, 2011, 2014; Hughes et al., 2005). The present study is similar to some of these studies in that it focused on setting student learning outcomes as a priority (Curwood, 2011, 2014), and it is similar to others that examined social contexts over time (Cifuentes et al., 2011; Hughes et al., 2005). Yet, the present study also examined the entire context in which the study took place to provide a different lens through which to look. This section explores the similarities and differences between other research studies that also focused on learning communities in which the goal was to integrate technology into instruction (Cifuentes et al., 2011; Curwood, 2011; Hughes et al., 2005).

In Cifuentes et al.'s (2011) study of technology integration through a PLC, the researchers worked to build a learning community in which technology integration support was given to three rural school districts. Their study was similar to the present research study in that the researchers found out topics of interest from the teachers for areas of professional development before implementing professional development sessions. The researchers also helped teachers to build websites and lessons as well as establish pedagogical reasons for using technology, and they worked to help teachers share their insights regarding technology integration implementation. These components are similar to what occurred in the present study. The researcher in the present study worked to understand what the teachers wanted to get out of the PLC+ half-day professional development sessions. Also, teachers in this study used lessons and digital tool ideas from 'Appy Hour and weekly e-mailed lesson plans. The researcher worked to help teachers first determine a learning goal and then decide which tools would make the most pedagogical sense for what teachers wanted students to accomplish. One finding from Cifuentes et al.'s (2011) study was that the teachers needed support to focus their learning community around student outcomes. This is similar to the findings for the present study in that the teachers in the present study had a difficult time setting student goals. Also, Cifuentes et al. found that "the learning community provides the social context for sustained involvement in technology integration" (p. 78). This is similar to Laura's and Donna's statements about their roles within their PLC when it came to sharing and learning about technology. Laura stated that part of her role was to try out new digital tools and let the others know what worked and what didn't work. Donna stated that her teammates were mentors for her, as she had not previously used 1:1 Chromebooks with students.

Similarities and differences also were apparent between this study and another study in which the goal was to provide professional development to teachers within a supportive learning environment so they could learn about integrating technology into an English curriculum (Curwood, 2011). Curwood's (2011) study also took place over the course of 1 year, which is similar to the present study which took place from September to May, the course of 1 academic year. Curwood's (2011) study suggested that technology integration can be supported by professional development that includes sustained dialogue around teachers' curricular goals and students' learning outcomes. Curwood's (2011) findings are similar to the findings in the present study, in which explicit mediation around the tools and signs of the English Language Arts CCSSs and the TIPC model were used to help teachers with setting student goals. Factors that were present in Curwood's (2011) study that were not present in this study include ongoing analysis of students work and a view of knowledge as social construction. In the present study, it was not clear if the teachers viewed knowledge as being constructed together, even though this is what was occurring through explicit and implicit mediation around the tools and signs of the English Language Arts CCSSs and the TIPC.

Finally, a study by Hughes et al. (2005) focused on content-specific technology integration. The focus of this particular study was to examine the nature of teachers' learning about technology when participating in an inquiry group, the ways in which teachers integrated what they learned into student learning activities, and how features of the learning context influenced teacher learning. The authors' approach acknowledges that the knowledge to be learned by teachers is constantly changing and being negotiated through shared practice. This acknowledgement is similar to the present study in that this present

study used the theoretical lens of social development theory (Vygotsky, 1978). According to Vygotsky (1978), social learning occurs through implicit and explicit mediation. Knowledge is built together, similar to the acknowledgements of Hughes et al. (2005), in that knowledge is negotiated through shared practice. Another similarity shared by Hughes et al.'s (2005) study and the present study is that both studies examined situative elements. For example, Hughes et al. (2005) examined physical and social inquiry group contexts as well as available digital tools. The present study examined the activity system in which the study occurred, which encompassed the context in which the study occurred. Findings from Hughes et al., as well as those from the present study, suggest that there is a need for collaborative technology learning and integration with a community of learners. Also, both studies suggest that social support from peers is an important condition for successful technology integration, a statement also supported by Zhao et al. (2002). Differences between the Hughes et al. (2005) study and the present study include the use of an inquiry-based approach by which each teacher focused on a separate project. Also, Hughes et al. focused more on the knowledge learning between the research experts and participants, not necessarily on the knowledge building within the group of teachers, as this study did.

### **Improving Practices for PLCs**

Based on the findings from this study, it is important for teachers to have tools and signs for them to develop common understanding. Vygotsky (1978) argued that it is important to understand the history of tools and signs. Knowing how teachers perceive tools and their understanding of the tools can help support their learning as well as how they function as a group. These tools and signs would work best to sustain the endurance of PLC work if they are commonly understood, not just at the teacher level, but also district wide so

that support from all levels can be consistent. This idea of sustainability is consistent with the literature on PLCs (Bolam et al., 2005).

Highly functioning PLCs have formalized, collaborative ways of identifying student goals, assessing whether students have met those goals, and responding instructionally (Graham & Ferriter, 2010). Teachers cannot be left to figure this out on their own. Leaders need to determine the level of support teachers need to perform as a highly functioning PLC. A more knowledgeable other (Vygotsky, 1978) may need to work with a group of teachers until they are able to internalize the PLC process.

Consistent with other research findings, this study demonstrated that teachers need dialogue around student learning goals and ideas of how to use digital tools that fit within teachers' contexts (Curwood, 2011, 2014; Hughes et al., 2005). By using a structure such as 'Appy Friday, by which teachers were e-mailed pre-made lesson plans with digital tools matching student goals, teachers were able to see how digital tools could fit into their own teaching context to help students reach literacy goals. Using the PLC structure, teachers were able to talk as a group about the digital tools and even problem solve as to how best to use them. It is important for leaders to determine from where the ideas for digital tools will come and how teachers will be supported with this work.

One example of setting up PLCs within a district may look like the following. District leaders and stakeholders would define the goals they would like to see as a result of implementing PLCs within the district. Using common mediating artifacts (or tools and signs), leaders would work with school building leaders and other stakeholders to build common knowledge surrounding the mediating artifacts (also known as explicit mediation). Teachers may be involved with initial explicit mediation, or this may occur later. A decision

would have to be made about who would carry out explicit mediation, depending on the context of individual school settings. Based on the mediating artifacts, or tools and signs, used to support the PLC process, rules within the PLCs would need to be determined. For example, teams would meet once a week or once every other week to focus on the four guiding questions of a PLC; other topics would be addressed during a separate meeting. Members of the community would need to decide who would support the teams of teachers through the process of implementing the framework of the PLC. This may be administrators, members of an instructional leadership team, or other staff members. Finally, staff members would need to determine whether the goal was met or if adjustments need to be made.

### **Professional Development**

Three recommendations for future professional development should be considered as an outcome of this study. The first recommendation is to make sure teachers know how to create common formative assessments in the area of literacy and then use the data to make instructional decisions. The process of setting a student learning target as a group of teachers, or as a PLC, may be new to some teachers. They need support in gaining knowledge about the steps to this process, which leads to the next recommendation. The second recommendation is to provide teachers with support from a “more knowledgeable other” when working with new standards, learning to set student learning goals and measuring these goals, and learning how to integrate technology meaningfully into literacy instruction. This support may come from an administrator, a lead teacher, instructional coach, or curriculum coordinator. Finally, when considering policy adoption, careful consideration should be given to the amount of support needed by states, districts, and teachers to implement such policies. It takes time to implement new standards well.

Teachers must have time to learn the new standards or policies, observe how students respond, and make instructional adjustments. This requires time to plan instruction and have meaningful conversations, including an introduction to the new policy or standards through a more knowledgeable other.

### **Future Research**

Based on the findings from this study, future research should be conducted to examine how time is spent during PLC meetings. This may be done through multiple case studies as well as through discourse analysis. Findings from this study may be consistent with what happens during most PLC meetings, or these findings may represent outlying data. Certainly, comparing differences in how PLCs are structured, organized, and supported could show differences in how time is spent during PLC meetings.

Another area of research is to examine the experiences of teachers in PLCs whose aim is to integrate technology into literacy instruction when teachers are already familiar with the teaching standards. Following this same group of teachers over the course of another year, after they have implemented the English Language Arts CCSSs, would certainly yield different data on how time is spent during implicit activity.

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## APPENDIX A. IRB FORM

IRB ID: 14-403

## INSTITUTIONAL REVIEW BOARD (IRB)

## Exempt Study Review Form

RECEIVED

Title of Project: Exploration of Teachers' Use of the Technology Integration Planning Cycle

AUG 07 2014

Principal Investigator (PI): [REDACTED]		Degrees: Ph.D.
University ID: [REDACTED]	Phone: [REDACTED]	Email Address: amyhutch@iastate.edu
Correspondence Address: E051 Lagomarcino Hall		
Department: School of Education		College/Center/Institute: Human Sciences
PI Level: <input checked="" type="checkbox"/> Tenured, Tenure-Eligible, & NTER Faculty <input type="checkbox"/> Adjunct/Affiliate Faculty <input type="checkbox"/> Collaborator Faculty <input type="checkbox"/> Emeritus Faculty <input type="checkbox"/> Visiting Faculty/Scientist <input type="checkbox"/> Senior Lecturer/Clinician <input type="checkbox"/> Lecturer/Clinician, w/Ph.D. or DVM <input type="checkbox"/> P&S Employee, P37 & above <input type="checkbox"/> Extension to Families/Youth Specialist <input type="checkbox"/> Field Specialist III <input type="checkbox"/> Postdoctoral Associate <input type="checkbox"/> Graduate/Undergrad Student <input type="checkbox"/> Other (specify: )		

By IRB

## FOR STUDENT PROJECTS (Required when the principal investigator is a student)

Name of Major Professor/Supervising Faculty:		
University ID:	Phone:	Email Address: @iastate.edu
Campus Address:		Department:
Type of Project: (check all that apply) <input type="checkbox"/> Thesis/Dissertation <input type="checkbox"/> Class Project <input type="checkbox"/> Other (specify: )		

Alternate Contact Person:	Email Address:
Correspondence Address:	Phone:

## ASSURANCE

- I certify that the information provided in this application is complete and accurate and consistent with any proposal(s) submitted to external funding agencies. Misrepresentation of the research described in this or any other IRB application may constitute non-compliance with federal regulations and/or academic misconduct.
- I agree to provide proper surveillance of this project to ensure that the rights and welfare of the human subjects are protected. I will report any problems to the IRB. See Reporting Adverse Events and Unanticipated Problems for details.
- I agree that modifications to the approved project will not take place without prior review and approval by the IRB.
- I agree that the research will not take place without the receipt of permission from any cooperating institutions when applicable.
- I agree to obtain approval from other appropriate committees as needed for this project, such as the IACUC (if the research includes animals), the IBC (if the research involves biohazards), the Radiation Safety Committee (if the research involves x-rays or other radiation producing devices or procedures), etc., and to obtain background checks for staff when necessary.
- I understand that IRB approval of this project does not grant access to any facilities, materials, or data on which this research may depend. Such access must be granted by the unit with the relevant custodial authority.
- I agree that all activities will be performed in accordance with all applicable federal, state, local, and Iowa State University policies.

8/7/14

Signature of Principal Investigator

Date

Signature of Major Professor/Supervising Faculty Date  
(Required when the principal investigator is a student)

- I have reviewed this application and determined that departmental requirements are met, the investigator(s) has/have adequate resources to conduct the research, and the research design is scientifically sound and has scientific merit.

Printed Name of Department Chair/Head/Director

Signature of Department Chair/Head/Director

Date

For IRB Use Only	<input type="checkbox"/> Not Research Per Federal Regulations	<input type="checkbox"/> No Human Participants	Review Date: 9/10/14
	<input checked="" type="checkbox"/> Minimal Risk	EXEMPT Per 45 CFR 46.101(b): 1, 2	
IRB Reviewer's Signature		9/10/14	
Office for Responsible Research			
Revised: 8/15/13			

**APPENDIX B. SURVEYS AND INTERVIEWS****E-Mail Survey**

1. How many times do you meet as a team each week?
2. How do you determine what you will talk about?
3. How do you determine what you will accomplish?
4. What is your building PD focus, currently?
5. How does this fit in with your PLC work?
6. If you had everything else taken off your plate, what would a string of ideal PLC meetings look like for you?
7. What might be some ways to make this happen?

**December Semistructured Interview Questions**

1. What has been the role of your team when integrating technology into the classroom?
2. What do you feel your role is within your team when you're working together to integrate technology?
3. How did your team approach using technology before using the Technology Integration Planning Cycle?
4. What has been your experience with being involved in the grant project?



**May Semistructured Interview Questions**

1. What beliefs do you hold about technology integration?
2. What do you feel is the purpose/function of a PLC?
3. Has the Technology Integration Planning Cycle influenced your PLC? Is so, how?
4. How has the Technology Integration Planning Cycle influenced your classroom instruction?
5. What is your philosophy of literacy instruction?

**APPENDIX C. ARTIFACTS FROM PLC+ TRAINING****Iowa Core Technology Literacy Skills – 5<sup>th</sup> Grade****21.3–5.TL.1**

**Essential Concept and/or Skill:** *Use technology resources to create original products, identify patterns and problems, make predictions, and propose solutions.*

- Demonstrate creative thinking to generate new ideas and products using a variety of technology tools and resources.
- Create and share new ideas, products, and processes related to curriculum content.
- Work individually and collaboratively to create, display, publish, or perform media-rich products.
- Use models and simulations to identify problems and propose solutions.
- Use technology resources to gather and depict data, recognize trends, and project outcomes.

**21.3–5.TL.2**

**Essential Concept and/or Skill:** *Use interactive technologies in a collaborative group to produce digital presentations or products in a curricular area.*

- Use a variety of technology tools to work collaboratively with others inside and outside the classroom.
- Use telecommunication tools efficiently to communicate information and ideas to multiple audiences.
- Access remote information using technology.
- Engage in learning activities with learners from other countries and/or cultures.
- Appropriately contribute to project teams to produce original works or solve problems

**21.3–5.TL.3**

**Essential Concept and/or Skill:** *Utilize digital tools and resources to investigate real-world issues, answer questions, or solve problems.*

- Create a plan or process that utilizes digital tools and resources to investigate and answer issues, questions, or problems.
- Locate, organize, and ethically use information from a variety of sources and media.
- Access information for specific purposes, and assess the validity of the information source.
- Identify, select, and organize data. Discuss and describe the results.
- using technology.

**21.3–5.TL.4**

**Essential Concept and/or Skill:** *Use technological resources to develop and refine questions for investigation.*

- Choosing from a variety of real–world issues and/or problems, use technological resources to develop and refine questions for investigation.
- Use technological resources to conduct research and complete a project.
- Identify trends or solutions or assist students in making decisions.
- Identify and explore diverse perspectives and processes to find multiple solutions to problems.

**21.3–5.TL.5**

**Essential Concept and/or Skill:** *Understand and practice appropriate, legal, and safe uses of technology for lifelong learning.*

- Demonstrate awareness of the dangers of sharing personal information with others.
- Demonstrate an understanding of what electronic theft and plagiarism are and why they are harmful.
- Identify the positive values of using technology to accomplish tasks.
- Use technology to explore and pursue personal interests.
- Show others how to use new technologies, and use technology in a way that assists, rather than prevents, others from learning.

**21.3–5.TL.6**

**Essential Concept and/or Skill:** *Understand technology hardware and software system operations and their application.*

- Use everyday technology processes, hardware, and software.
- Select the most efficient and appropriate technology tool for a specific task.
- Begin to identify the source of a problem with technology, and, if necessary, identify the appropriate support personnel.
- Apply prior knowledge of technologies to new technologies.

**Fifth Grade TQ**  
**November 25, 2014**  
**East Elementary**  
**Teaching and Learning Center (Old Guidance Office)**  
**7:30–11:30**

	<b>Outcomes</b>	<b>Process</b>	<b>Content</b>
8:00–8:30	Determine student targets for literacy (4–6 weeks)	Use BAS Data, MAP and other current data sources to determine student needs	BAS Wheel of Reading Behaviors Data from classroom
8:30–8:45	Align targets to Iowa Core	Examine target(s) for student learning. Look at Anchor Standards for Reading. Which one(s) align most closely with what our students currently need?	5 <sup>th</sup> Grade Iowa Core Reading Standards Targets from previous activity BAS Wheel of Reading Behaviors
8:45–9:15	Determine how we know students are proficient	1. What do we use to determine student targets? 2. How do we know students have hit these targets? 3. How do we determine proficiency at East Elementary?	Discussion Questions PLC outcomes document Owacki book Blauman and Burke resource
9:15–10:45	Create Learning Sequence	Deb's Article (Digital Storytelling) Balanced Literacy Framework	Balanced Literacy Framework Document Exemplar Texts from Iowa Core Online texts and resources Toolkit Texts Other?
10:45–11:30	Determine Technology to Support	What is it we want students to do? What technology may support this? What is feasible at this point? What are we willing to commit to?	TIPCLLA Flow-chart and Questions to Ask iPad Apps list Chromebook Apps list Bloom's Digital Taxonomy

**APPENDIX D. TEACHER-CREATED RUBRIC**

	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>Find <u>similarities</u> between books on the same topic.</b>	Includes HLT, conflict, protagonist, climax	Find 2 similarities based on literary elements	Find 1...	
<b>Find <u>differences</u> between pieces of literature on the same topic.</b>	Find 1 or more theme and back up, including use of HLT	Find 3 differences and back up with evidence literary elements		
<b>Find the <u>theme</u> of a piece of literature.</b>	3+, see above	Find theme and back up with evidence, include literary elements	Found a theme but was unable to support with text evidence...	Unable to identify a theme
<b>Representation of Learning</b>				

## APPENDIX E. DATA ANALYZED BY PROCESS AND IMPLICATIONS

Activity Unit	Processes	PLC Implications
PLC November 17, 2014	Teachers suggest various resources to explore during their PLC+	The teachers are not able to focus on a common goal; they reach for resources that may be of help
PLC November 17, 2014	Forming common meaning through dialogue  Using prior experiences and signs to understand new sign	Through dialogue, teachers begin to create common meaning and understanding of these signs
PLC+ Part 1 November 25, 2014	Forming common meaning through dialogue  Using prior experiences and signs to understand new sign  Negotiating common meaning for student learning	Through dialogue, teachers begin to create common meaning and understanding of these signs
PLC+ Part 1 November 25, 2014	Using outside source to help build meaning for common sign	Having a common resource to draw upon provides the teachers common information on which to build meaning through dialogue
PLC+ Part 1 November 25, 2014	Exploring possibilities of blog  Building on each other's ideas	Through dialogue, teachers explore possible uses for digital tool with students as it relates to intended outcomes
PLC+ Part 2 November 25, 2014	MKO (more knowledgeable other) sharing possible ways to use tools with students  Building on each other's ideas	Through dialogue with MKO, teachers explore possible uses for digital tool with students as it relates to intended outcomes
PLC December 8, 2014	Beginning with end project  Directing teachers to common sign	The teachers begin with end project; they have not internalized TIPC as sign or the PLC process
PLC February 2, 2015	Forming common meaning through dialogue  Using prior experiences and signs to understand new sign	Bringing the teachers back to their co-constructed rubric helps them to clarify goals and reconstruct artifact
PLC February 2, 2015	Problem solving together to get tool to work  Building on each other's ideas	Through dialogue, teacher and researcher problem solve ways to get the digital tool to work
PLC March 23, 2015	Building on each other's ideas  Problem solving  Sharing experiences	By sharing experiences and what they may try, teachers are able to plan for using digital tools with students

Activity Unit	Processes	PLC Implications
PLC March 30, 2015	<p>Recalling previous sign with common goals</p> <p>Discussing student learning based on previous sign</p> <p>Searching for sign</p> <p>Experiencing frustration with not being able to find documents</p>	<p>The team experiences difficulty when they are unable to locate common signs such as the District Created CCSS Document and the CCSS</p>
PLC April 6, 2015	<p>Using general terms to talk about student learning</p>	<p>Teachers are able to talk vaguely about the same student goal</p> <p>This artefact was not referenced with students to give feedback or examined together by teachers as part of PLC work</p>
PLC April 6, 2015	<p>Noticing students digital literacy skills and motivation</p> <p>Sharing experiences with students</p>	<p>Reflecting on students' use of tools allows teachers to see what was happening in each other's classrooms with technology</p>
PLC+ April 20, 2015	<p>Using common sign to set student goals</p>	<p>Independently, the team is using a common sign to begin with a student goal</p>
PLC+ April 20, 2015	<p>Using common sign to set student goals</p>	<p>Independently, the team is using a common sign to begin with a student goal</p>
PLC+ April 20, 2015	<p>Using common sign to clarify standard</p>	<p>Having easy access to the standards allows the teachers to have more fluid conversations about the meaning of the standards</p>
PLC+ April 20, 2015	<p>Using common sign to clarify standard</p>	<p>Having easy access to the standards allows the teachers to have more fluid conversations about the meaning of the standards</p> <p>Being able to articulate the standards, with clear student targets, allows teachers to select digital tools that would most benefit student learning</p>
PLC+ April 20, 2015	<p>Using outside resources to create common meaning for student goals, resources for teaching, and digital tools</p>	<p>Teachers are taking ownership of the TIPC</p>
PLC May 4, 2015	<p>Problem solving how to use tool with students</p> <p>Building on each other's ideas</p>	<p>Having others to discuss digital tools helps teachers think about how to make them work in the classroom before they use them with students</p>

## APPENDIX F. A NETWORK OF PROCESSING SYSTEMS FOR READING



(Source: Fountas & Pinnell, 2014, back cover)